



Ontario's Retail Sales Tax Exemption Program for Production Machinery and Equipment: An Economic Assessment

Presented by
The Honourable W. Darcy McKeough
Treasurer of Ontario
in the Legislative Assembly of Ontario
March, 1978

3 *Miscellaneous
publications*



1 *L* Ontario

2 *L* Ministry of Treasury, Economics and
Intergovernmental Affairs/
Taxation and Fiscal Policy Branch

CA20N
TR90
-78056



Digitized by the Internet Archive
in 2024 with funding from
University of Toronto

<https://archive.org/details/31761120607023>

CAZON
TR90
-78056

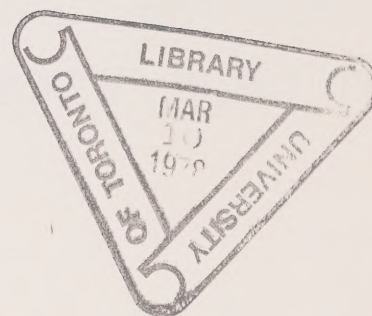
Ontario's Retail Sales Tax Exemption Program for Production Machinery and Equipment: An Economic Assessment

Presented by
The Honourable W. Darcy McKeough
Treasurer of Ontario
in the Legislative Assembly of Ontario
March, 1978



Ontario

Ministry of Treasury, Economics and
Intergovernmental Affairs
Taxation and Fiscal Policy Branch



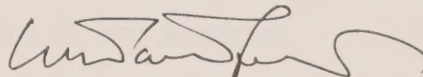
Preface

In a statement to the Legislature on November 23, 1976 entitled "Ontario's Economic Strategy for 1977", I explained the need to improve our industrial productivity and to recognize the importance of profits in the economic growth process. I also announced details of a number of significant corporate tax measures designed to stimulate business investment. A major action taken was the introduction of a long-term exemption from retail sales tax for production machinery and equipment, effective January 1, 1977. This incentive replaced a temporary exemption which was expiring at that time.

During debate in principle on the requisite legislation (Bill 170), an amendment was agreed to which required a report evaluating its economic impact to be tabled no later than the commencement of the Session beginning after January 1, 1978. The review was to consider the effects of the retail sales tax exemption on public revenues, job creation, unemployment, investment, and growth in the productive sector in Ontario.

I am pleased to meet this requirement by today tabling for the interest of the Members this Report which is entitled "Ontario's Retail Sales Tax Exemption Program: An Economic Assessment". The Report reflects the combined results of analyses by Treasury staff and the Institute for Policy Analysis, University of Toronto, as well as a survey of corporate opinion.

In my view, this Report provides ample justification for forgoing the tax dollars associated with the retail sales tax exemption. It confirms the Government of Ontario's faith in private industry.



W. Darcy McKeough
Treasurer of Ontario.

Table of Contents

	PAGE
Preface	3
Summary and Conclusion	7
I Introduction	9
II The Importance of Ontario's Manufacturing and Processing Industries	11
III Factors Influencing the Location of Industry	14
IV Ontario's Fiscal Strategy to Stimulate the Private Sector . . .	15
—Public Sector Restraint	15
—Maintaining a Competitive Tax Climate in Ontario	16
V Assessment of the Retail Sales Tax Exemption Program . . .	20
A. Growth in Investment in Ontario under the Temporary Exemption, 1975-1977	20
B. Econometric Assessment of the Long-Term Exemption, 1977-1982	24
C. Corporate Attitudes Toward the Production Machinery Exemption	30
Appendix: Report by the Institute for Policy Analysis, University of Toronto	35

Summary and Conclusion

- Ontario's long-term retail sales tax exemption for production machinery and equipment has a considerable stimulative impact on provincial capital investment, output, productivity and employment. As well, the spillover of economic benefits to the rest of Canada is substantial.
- The benefit-cost ratio is high: for every one million dollars of Government revenue forgone, more than two million dollars worth of economic activity is generated within the province of Ontario alone. For example, it is estimated that in 1979 the net cost of the tax incentive is \$149 million after allowing for positive revenue feedback effects which reduce the cost of the program. The resulting increase in Gross Domestic Product in the same year will be \$442 million, for a benefit-cost ratio of 2.97.
- According to a special University of Toronto econometric study which examines the direct and indirect economic impacts of the retail sales tax exemption, and upon which the conclusions of this paper are partly based, 70,000 man-years of employment will be created in Canada as a whole by the incentive over the period 1977-1982, or an average of almost 12,000 per year.
- The University of Toronto study calculates that substitution of capital for labour occurs which, in purely quantitative terms, reduces Ontario's employment growth in 1977 and 1978, although 30,000 net new jobs are created in Ontario by the incentive from 1978 to 1982. However, according to the study, the estimated negative employment effects for the first two years of the program can easily be offset by factors which are not included in the scope of the econometric analysis. These include the general stimulation arising from the resulting improvement in business confidence and the attraction and/or retention of firms by the more favourable investment climate.
- Taking these factors into account, it seems reasonable to expect that about one-half of the 70,000 new jobs will be placed within Ontario over the six-year period 1977-1982, with the province's share increasing sharply toward 1982. Beyond that point, the bulk of the new employment generated occurs within Ontario.
- The economic multipliers are very large, rising to over 2 by 1982. The University of Toronto study concludes that:
 - In terms of investment, the tax exemption generates additional real growth in each of the years 1977 to 1982. The smallest increment is one percentage point in 1977, but net additional investment rises quickly to three percentage points by 1980. For the remaining two years, the growth in real investment exceeds three percentage points annually.
 - In terms of output, the tax exemption increases the growth of Ontario's Gross Domestic Product by more than one-half of one percentage point in each of the years 1979 to 1982. This reflects the economic multipliers for Ontario which range from a low of 1.35 to a high of 2.15. A multiplier of 2.15 means that for each dollar of sales tax revenue forgone, the value of output in the province rises by \$2.15.
 - Labour productivity in Ontario improves as a result of the exemption by up to 0.6 per cent annually. In those industries directly affected by the exemption, the productivity of labour is expected to increase by up to three times the amounts calculated for the province as a whole.

—In terms of prices, the exemption brings about a reduction in the rate of growth of both the Consumer Price Index and the Gross National Product price deflator. The expected rate of price increase is reduced by an annual average of 1/10 and 2/10 of one percentage point for the two indices respectively. In 1978, for example, the rate of increase in the CPI is reduced from 7.1 per cent to 6.9 per cent, while the GNP price deflator is reduced from 7.4 per cent to 7 per cent.

- The incentive has helped increase the private sector share of investment, reinforcing the Government's fiscal strategy of restoring a more appropriate balance between private and public investment.
- The retail sales tax exemption for production machinery and equipment generates Gross Domestic Product improvements which are greater than those associated with other policy alternatives, as confirmed by the University of Toronto study. With these additions to output come productivity improvements and price reductions essential to improving Ontario's international competitiveness. It is these permanent improvements which form the basis for the positive impact of the tax incentive on employment. Moreover, the improved investment climate itself generates output increases, employment gains and revenue feedbacks over the forecast period and beyond. According to the University of Toronto study, these effects combine to improve the benefit-cost projections and lower materially the effective costs of the exemption.

I Introduction

Effective January 1, 1977, the Government of Ontario introduced a new long-term tax incentive to reduce costs for Ontario industry, improve productivity and enhance the province's competitive position. This incentive program, at an estimated cost of \$160 million in 1977, exempts from the seven per cent retail sales tax all production machinery and equipment purchased by private industry for use directly in the production process. Included in the exemption is a wide range of manufacturing, processing, mining, logging, waste removal and pollution control equipment, as well as all parts used in major modifications of machinery and equipment.¹ It replaces a temporary exemption in effect for machinery and equipment ordered between April 8, 1975 and December 31, 1976.

This Report provides an assessment of the economic effects of the sales tax exemption in terms of its impact on investment, output, employment, prices and Government revenues. However, there are a number of factors which complicate the analysis:

1. The sales tax exemption is a *long-term* measure which has been in operation only since January, 1977. As such, only one year of actual experience is available and even for that year the data is incomplete. This information alone is not an acceptable basis upon which to judge the program's impact over the longer run.
2. The short-term program which the new incentive replaced also impacted on investment plans beyond 1976 since it undoubtedly accelerated some investment decisions.
3. The performance of the incentive is sensitive to the economic environment which it is itself designed to influence. Thus, estimates of its impact will reflect the current state of the economy as well as the assumed economic forecast.
4. Behavioural responses are very difficult to pin down and to estimate with certainty.

These problems mean that there is neither a single method of analysis nor abundant data from which definitive results can be drawn. As a result, this Report presents three separate sets of information and analysis in assessing the economic impact of the long-term sales tax exemption:

1. Actual data on private and public investment in Ontario and in the rest of Canada from 1970 to 1977 are examined to analyze the effect of the temporary sales tax exemption on the growth in new capital formation and private/public sector shares of investment.
2. An independent econometric analysis by the Institute for Policy Analysis, University of Toronto, is presented, which utilizes sound theoretical concepts and employs a long-range economic forecast to estimate the effect of the reduction in business costs on private sector investment over the six-year period from 1977 through 1982.²
3. Results of a survey of manufacturing corporations are presented, which offer a broad interpretation of industries' positive response to the incentive.

¹See: Honourable W. Darcy McKeough, *Ontario's Economic Strategy for 1977* (Toronto: Ministry of Treasury, Economics and Intergovernmental Affairs, November 23, 1976); *The Retail Sales Tax Amendment Act No. 2*, Statutes of Ontario 1976, Chapter 82; and, Honourable Margaret Scrivener, *Information Bulletin—Retail Sales Tax Act*, No. SP2-77 (Toronto: Ministry of Revenue, August, 1977).

²Gregory V. Jump and D. Peter Dungan, *The Economic Impacts of Ontario's Retail Sales Tax Exemption for Production Machinery* (Toronto: Institute for Policy Analysis, University of Toronto, December 1, 1977). Reproduced in full as an Appendix.

In their combined weight of evidence, these three distinct pieces of analysis are very supportive of the beneficial economic impact of Ontario's retail sales tax exemption program on investment in machinery and equipment. The results provide further evidence that Provincial fiscal policy plays an important role in the economic health of Ontario. Previous studies have documented the fiscal impact of the Provincial budget over the longer term, and particularly the stimulative effects of the 1971 and 1975 Ontario Budgets.³

³Honourable W. Darcy McKeough, "New Directions in Economic Policy Management in Canada", Budget Paper A, *1971 Ontario Budget* (Toronto: Department of Treasury and Economics, 1971); Honourable W. Darcy McKeough, "Fiscal Policy Management in Ontario", Budget Paper A, *1972 Ontario Budget* (Toronto: Ministry of Treasury, Economics and Intergovernmental Affairs, 1972); Bernard Jones and Jill Berringer, "Federal and Ontario Fiscal Policy in 1970 and 1971", *Ontario Economic Review*, Vol. 9, No. 6 (November/December 1971); Honourable W. Darcy McKeough, "Ontario's Economic Recovery", Budget Paper A, *1975 Ontario Budget* (Toronto: Ministry of Treasury, Economics and Intergovernmental Affairs, 1975); and, Bernard Jones, Nancy Bardecki and Brian Hull, "Regional Stabilization Policy in Canada: The Ontario Record", a paper read at the annual meeting of the Canadian Economics Association in Fredericton (June, 1977).

II The Importance of Ontario's Manufacturing and Processing Industries

The retail sales tax exemption for production machinery and equipment lowers equipment costs for Ontario businesses. It benefits most those industries that are capital intensive by immediately improving profitability and, through increased investment, boosting productivity and employment. These industries—the primary and manufacturing industries—generate a substantial share of investment, employment, value added, exports and tax revenues in both the national and Ontario economies. The tax exemption is aimed at private manufacturing and processing activities in order to maximize the benefits which flow from the tax dollars forgone. Thus, an overview of the relative importance of these sectors will be useful in evaluating the tax exemption program.

Principal Manufacturing Statistics

The significance of Ontario manufacturing to the Canadian economy is shown clearly in the following comparison which indicates that almost 51 per cent of national value added in manufacturing originates in the province.

Principal Manufacturing Statistics, Ontario and Canada, 1975 **Table 1**

	Canada	Ontario	Ontario as a % of Canada
Number of Establishments	30,100	12,245	40.7
Production and Related Workers			
Number	1,272,051	612,745	48.2
Wages (\$ million)	12,672	6,317	49.9
Cost of Materials Used (\$ million)	51,177	25,560	49.9
Shipments (\$ million)	88,460	44,423	50.2
Value Added (\$ million)	36,139	18,358	50.8

Source: Statistics Canada, Cat. 31-203.

Employment

In Ontario, manufacturing and primary industries (other than agriculture) directly employ almost one million people. This represents over one-quarter of the total employment in the Ontario economy, and better than ten per cent of total national employment.

Ontario Employment by Industry, 1977 **Table 2**

	(000)	(%)	
Manufacturing	921	24.5	} 26.0
Primary other than Agriculture	57	1.5	
Agriculture	128	3.4	
Construction	230	6.1	
Wholesale and Retail Trade	624	16.6	
Transportation, Communication and Utilities	277	7.4	
Finance, Insurance and Real Estate	225	6.0	
Services	1,036	27.5	
Public Administration	265	7.0	
TOTAL	3,762¹	100.0	

Source: Statistics Canada, Cat. 71-001.

¹Does not add due to rounding.

The incomes generated by these industries indirectly support a substantial proportion of employment in the rest of the economy.

Output

In terms of output, the manufacturing and primary industries produce almost one-third of Ontario's Gross Domestic Product.

Distribution of Gross Domestic Product by Industry of Origin for Ontario, 1975 Table 3
(per cent)

Manufacturing	28.8	} 30.3
Primary other than Agriculture	1.5	
Agriculture	1.5	
Construction	5.8	
Transportation, Communication and Utilities	10.1	
Wholesale and Retail Trade	13.4	
Finance, Insurance and Real Estate	12.6	
Services	18.8	
Public Administration	7.5	
TOTAL	100.0	

Source: Ontario Treasury Estimates.

Capital Expenditures

Business capital expenditures in Ontario in 1977 totalled \$14.6 billion. The manufacturing sector was responsible for over 23 per cent of this total.

Total Capital Expenditures in Ontario by Sector, 1977 Table 4

	(\$ million)	(%)
Housing	3,422	23.5
Manufacturing	3,370	23.2
Utilities	2,644	18.2
Institutions and Government	2,114	14.5
Trade, Finance and Services	1,801	12.4
Primary and Construction	1,205	8.3
TOTAL	14,556	100.0¹

Source: Statistics Canada, Cat. 61-206.

¹Does not add due to rounding.

Exports

Total exports from Ontario in 1976, as shown in Table 5, were valued at \$15.7 billion. Sixty-six per cent comprised fully manufactured goods. Ontario is the source of 79.5 per cent of the total exports in this category. Motor vehicles and parts accounted for approximately one-half of the value of total Ontario exports.

Tax Revenues

Manufacturing also pays the greatest single share of Ontario corporate income and capital taxes. As shown in Table 6 below, the manufacturing group generates approximately 44 per cent of Ontario corporate income taxes and 21 per cent of the capital tax, for a total of 39.3 per cent of the Provincial revenues from these sources.

Exports by Commodity, Ontario and Canada, 1976

Table 5

	Canada	Ontario	Ontario as a % of Canada
	(\$000)	(\$000)	
Live Animals	134,623	42,001	31.2
Food, Beverages and Tobacco	4,145,952	635,201	15.3
Crude Materials	8,302,098	951,962	11.5
Fabricated Materials	12,305,305	3,589,173	29.2
End Products	13,045,976	10,376,933	79.5
Special Transactions	142,924	64,941	45.5
TOTAL	38,076,878	15,660,212¹	41.1

Source: *Ontario Exports 1976*, Ontario Ministry of Industry and Tourism.¹Does not add due to rounding.

Major Provincial Corporation Tax Revenues by Industry, 1975

Table 6

	Income Tax		Capital Tax		Total Taxes	
	(\$000)	(%)	(\$000)	(%)	(\$000)	(%)
Agriculture, Forestry and Fishing	5,655	0.8	1,052	0.6	6,707	0.7
Mining and Oil	38,386	5.1	4,785	2.8	43,171	4.7
Manufacturing	324,747	43.6	34,795	20.5	359,542	39.3
Construction	39,702	5.3	8,260	4.9	47,962	5.2
Transportation and Utilities	40,454	5.4	12,013	7.1	52,467	5.7
Wholesale Trade	58,331	7.8	7,287	4.3	65,617	7.2
Retail Trade	45,458	6.1	6,591	3.9	52,049	5.7
Finance and Real Estate	126,633	17.0	33,822	20.0	160,455	17.5
Insurance	7,289	1.0	47,507 ¹	28.0	54,797	6.0
Services	35,773	4.8	7,011	4.1	42,784	4.7
Unclassified	23,226	3.1	6,362	3.8	29,588	3.2
TOTAL	745,654	100.0	169,484²	100.0	915,140²	100.0²

Source: Ontario Ministry of Revenue.

¹A special Insurance Premiums Tax is levied on insurance companies in lieu of the Capital Tax.²Does not add due to rounding.

The Ontario manufacturing and processing industries comprise a vital part of the provincial and national economies. It has been shown that, in terms of investment, employment, value added, exports and taxation revenues, these industries directly contribute a substantial share of total economic activity. In addition, they foster growth in other industries such as finance, transportation, and trade and services, and thus contribute substantially to the achievement of a high level of essential public services. It is therefore of paramount importance to ensure that these industries are internationally competitive.

III Factors Influencing the Location of Industry

Vigorous competition among international jurisdictions to retain existing industries and attract new investments has intensified in recent years in response to the sluggish world economy and high levels of unemployment. In today's world of multinational corporations, with few restrictions on the flow of capital across borders, freer access to foreign markets and easy access to information through modern electronic facilities, the investment dollar can more easily seek the environment that offers the optimum return. The climate created by government policy can greatly alter the potential returns and risks associated with industrial investments.

Respondents to the Ontario Corporations Survey 1977⁴ confirmed the following factors as the most important in determining the location of a new investment:

1. Availability of a reliable labour force with varied skills at competitive prices.
2. Availability and proximity of raw materials.
3. Distance to market.
4. Level of taxation.
5. Adequacy of transportation systems.
6. Stability of governments and their attitudes toward business.

These results are neither new nor surprising. Taken together, they describe an environment in which the risks associated with business ventures are minimized. Canada and Ontario are endowed with an abundance of raw materials, and government action has been instrumental in creating an investment climate and economic infrastructure conducive to development. Excellent health and education systems, as well as safety and environmental standards, guarantee a productive labour force. Canada's and Ontario's transportation systems compare favourably to those of any country in the world.

With respect to certain factor costs, however, Canada is less attractive. Financing costs of plant and equipment and of inventories are higher in Canada than in the United States, with a spread in interest rates on corporate bonds of 1 to 1½ percentage points not uncommon. In addition, the cost of physical structures is increased by climatic requirements, and pollution and building standards. Much of Canada's production machinery is imported, with resultant higher costs than for similar acquisitions in the United States. Distances to markets are considerably greater, entailing additional transportation and distribution facilities. Finally, wage costs have escalated steadily in Canadian manufacturing, rising from 86 per cent of comparable average hourly earnings in American manufacturing in 1970, to 112 per cent in 1976. However, on a positive note, wage settlements moderated in Canada during 1977 and the Canadian dollar has depreciated about 11 per cent vis-à-vis the American dollar. These developments have improved Canada's and Ontario's relative positions.

It is essential that government policy recognize the high cost structure in Canada relative, in particular, to the United States. Ontario's proximity to and dependence on the large United States market presents great opportunities but equally great challenges. To penetrate that market, and indeed to prevent American domination of the Canadian market without the imposition of massive trade barriers, the cost structure in Ontario must be competitive. Fiscal policy is an appropriate vehicle for offsetting some of the burden of unavoidable costs through the maintenance of a proper balance between private and public sector growth, and through tax rate and base adjustments.

⁴An annual survey of the 200 largest corporations doing business in Ontario.

IV Ontario's Fiscal Strategy to Stimulate the Private Sector

The primary objectives of the retail sales tax exemption program are to strengthen Ontario's competitive position and to improve the investment climate. It is important to note, however, that the incentive is part of a larger plan to stimulate investment. Complementary fiscal actions create an environment within which the sales tax incentive can be most effective. These policies include:

- restraint on growth of the government sector in Ontario through a balanced budget objective;
- the implementation of competitive corporate income tax rates; and,
- special incentives to manufacturing, mining and processing operations.

Public Sector Restraint

The Government of Ontario is committed to achieving a balanced budget by 1981, thereby reducing its net cash requirements from the current level of approximately \$1.6 billion to zero. This policy has been adopted in order to:

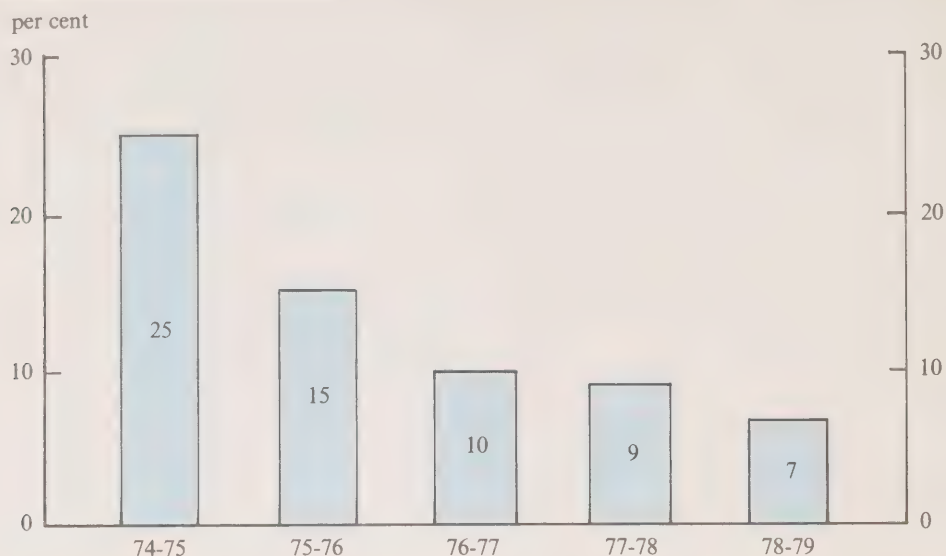
- free-up resources (labour, materials and capital) for private sector use;
- cap the growth in the public sector;
- make government more efficient;
- reduce government borrowing to avoid the crowding-out of private borrowers; and,
- improve the climate for investment.

The details of Ontario's expenditure restraint program will not be discussed here.⁵ Instead, Chart 1 summarizes the substantial reductions in expenditure growth achieved by the Province since 1975.

The Government's public sector restraint program also extends to reductions in complement. Between March 1, 1975 and December 31, 1976, the size of the Ontario civil service was reduced by six per cent. As well, Ontario municipalities and agencies and the Province's own corporations, including Ontario Hydro, have been influenced to streamline their own budgets in a parallel fashion. This overriding policy objective of constraining public sector growth is supportive of the retail sales tax exemption program since it also reduces costs for business by tempering governments' demands in terms of materials, labour and capital.

It should be noted that the exemption from sales tax for production machinery and equipment does not extend to purchases by governments, nor by their corporations or agencies. The benefits are directed strictly to eligible investments by private businesses. It would be inconsistent to allow the tax benefits to flow to the public sector since it is supposed to set an example in applying restraint.

⁵Honourable W. Darcy McKeough, *1975 Ontario Budget* (Toronto: Ministry of Treasury, Economics and Intergovernmental Affairs, 1975); Honourable W. Darcy McKeough, *Supplementary Actions to the 1975 Ontario Budget* (Toronto: Ministry of Treasury, Economics and Intergovernmental Affairs, 1975); Honourable W. Darcy McKeough, *1976 Ontario Budget* (Toronto: Ministry of Treasury, Economics and Intergovernmental Affairs, 1976); *Report of the Special Program Review* (Toronto: Queen's Printer, 1975); Honourable W. Darcy McKeough, *Ontario's Response to the Report of the Special Program Review* (Toronto: Ministry of Treasury, Economics and Intergovernmental Affairs, 1976); and, Honourable W. Darcy McKeough, *1977 Ontario Budget* (Toronto: Ministry of Treasury, Economics and Intergovernmental Affairs, 1977).



Source: Ontario Treasury.

Maintaining a Competitive Tax Climate in Ontario

In Ontario, the retail sales tax exemption program is one of many special provisions which have been implemented to encourage investment in manufacturing and processing, including:

- *a reduced rate of corporation income tax*: the net federal tax rate applied to manufacturing profits is 30 per cent; the general rate of 36 per cent applies to income from other sources;
- *accelerated depreciation provisions* (both federal and Ontario): manufacturing and processing machinery and equipment can be completely written off in two years, whereas similar assets in other industries are depreciated at a maximum annual rate of 20 per cent on a declining balance basis;
- *a three per cent inventory allowance* (federal and Ontario), to provide relief from the effects of inflation;
- *an investment tax credit*: for federal tax purposes the manufacturing sector is eligible for a tax credit equal to five per cent of eligible capital expenditures in southern Ontario, and seven and one-half per cent for those in northern Ontario;
- *sales tax exemptions for production machinery and equipment* (federal and Ontario); and,
- *Provincial fuel tax exemption* for industrial, commercial and institutional off-road purposes.

A low rate of income tax is applied to small businesses (10% federal plus 9% Ontario = 19%) and, effective January 1, 1978, substantial Ontario tax deferrals are available for investments in registered Venture Investment Corporations which will supply risk capital, and managerial advice and assistance to small businesses.⁶

⁶For further details see *A Report on the Status of Bill 44 (Venture Investment Corporations)* (Toronto: Ontario Ministry of Treasury, Economics and Intergovernmental Affairs, November 23, 1976); and, *The Venture Investment Corporations Registration Act, 1977*, Statutes of Ontario, 1977, Chapter 10.

Income Tax Burden on Manufacturing Corporations in Ontario
and Selected U.S. States, 1978
(per cent)

Table 7

	Statutory Rates			Effect of Major Incentives				Net Effective Combined Rate ⁶
	Federal	Provincial or State	Effective State Rate ¹	Combined Effective Rate	LIFO ²	3 Per Cent Inventory Allowance ³	Fast Write-Off ⁴	DISC ⁵
ONTARIO	30	12	12	42	0	-1.68	-6.72	0
New York	48	10	5.2	53.2	-4.26	0	0	-6.65
Pennsylvania	48	9.5	4.9	52.9	-4.23	0	0	-6.61
Ohio	48	8	4.2	52.2	-4.18	0	0	-6.53
Michigan	48	2.35	1.2	49.2	-3.94	0	0	-6.15
Wisconsin	48	7.9	4.1	52.1	-4.17	0	0	-6.51
Georgia	48	6	3.1	51.1	-4.09	0	0	-6.39
Texas	48	0	0	48.0	-3.84	0	0	-6.00
California	48	9	4.7	52.7	-4.22	0	0	-6.59
								33.60 ⁷
								42.29
								42.06
								41.49
								39.11
								41.41
								40.62
								38.16
								41.89

Source: Ontario Treasury Estimates.

¹In Canada, the federal statutory rate is reduced to 30 per cent by a 10 per cent provincial tax abatement. In the U.S. there is no comparable abatement; however, state taxes are deductible.

²The effect of the Last In, First Out (LIFO) provision was estimated by assuming the cost of goods sold to be 80 per cent of sales, an inflation rate of 6 per cent, an inventory turnover of two months, and a net return on sales of 10 per cent before taxes.

³The effect of the 3 per cent Inventory Allowance was estimated assuming the cost of goods sold to be 80 per cent of sales, an inventory turnover of two months, and a net return on sales of 10 per cent before taxes.

⁴The effect of the Fast Write-Off for manufacturing and processing machinery and equipment was estimated to result in a 16 per cent reduction of the effective rate, based on the cost of the incentive.

⁵The effect of the Domestic International Sales Corporations (DISC) incentive was estimated by assuming an export domestic split in production of 25 per cent and 75 per cent respectively.

⁶Both Canada and the U.S. have an Investment Tax Credit. In the U.S. the Investment Tax Credit at 10 per cent is more generous than Canada's graduated rates of 5 per cent, 7½ per cent, and 10 per cent (depending on the region). The effect of this might be to reduce the apparent spread between effective rates in Ontario and those in the U.S.

The burden of the Ontario Capital Tax is equivalent to approximately 1.1 corporate income tax points. As a result, the tax burden in Ontario would increase to approximately 34.7 per cent.

In general, the burden of income taxes which corporations face in Canada appears to be lower than that imposed on manufacturers in the United States. Table 7 summarizes the corporation income tax as it applies in Ontario and in representative American states. Based on the realistic assumptions noted in the Table, Ontario's corporate income tax burden—at a net effective rate of 33.6 per cent—is by far the lowest of the jurisdictions listed.

When the payroll taxes paid by employers in Ontario and the United States are included, Ontario's relative tax position is further improved. Table 8 shows that in 1978, employer payroll taxes per employee in the United States may be as high as \$1,205, compared with \$742 in Ontario.

Payroll Taxes Imposed on Employers, 1978

Table 8

	Ontario			United States		
	Rate	Base	Amount	Rate	Base	Amount
	(%)	(\$)	(\$)	(%)	(\$)	(\$)
Unemployment Insurance	2.1	12,480	262	3.2 ¹	4,200	134
C.P.P. ²	1.8	9,400	169			
Workmen's Compensation	2.07	15,000	311			
O.A.S.D.H.I. ³				6.05	17,000	1,071 ⁴
TOTAL			742			1,205

Source: Ontario Treasury Estimates.

¹This is the federal rate only. Most states have their own unemployment compensation programs and in these, the federal government gives employers a tax credit of 2.7 per cent; for example, if the state levy is 4 per cent, then the employer would pay a combined rate of 4.5 per cent—4 per cent state tax and (3.2%-2.7%) federal tax.

²Canada Pension Plan.

³Old Age Security, Disability and Health Insurance.

⁴In December, 1977 the United States Congress passed legislation that will greatly increase this limit over the next decade. By 1987 this maximum will reach \$3,046.

Lower corporate income and payroll taxes are a material offset to the higher front-end and operating costs experienced in Canadian manufacturing. Nevertheless, without the appropriate exemptions, federal excise taxes and the Provincial retail sales tax would impose additional front-end costs substantially in excess of those faced by the manufacturing industry in the selected American states. For example, the federal manufacturer's sales tax applies to business acquisitions of materials and supplies (other than production machinery, transportation equipment, and materials incorporated into or used up in the production of manufactured goods) at a rate of 12 per cent. It also applies to building materials at a rate of five per cent. No comparable indirect tax exists in the United States.

It is evident from the tax rates shown in Table 9 that the value of Ontario's sales tax exemption for production machinery is higher than those provided by the United States jurisdictions listed. To some degree, rate differences are offset by divergences between tax bases: some American states tax many more services, and wider ranges of goods, than does Ontario. However, prior to the removal of retail sales tax on production machinery and equipment in Ontario in 1975, the relative sales tax burden in the province was high. When this cost was added to the other factor cost differentials noted earlier, the total front-end costs of investment in the province significantly exceeded those of Ontario's closest competitors.

The elimination of retail sales tax on production machinery and equipment is one approach to reducing total front-end costs associated with the location of industry. Other

Retail Sales Taxes—Manufacturing Purchases

Table 9

	General Tax Rate	Treatment of Production Equipment ¹	Treatment of Services ²
	(%)		
ONTARIO	7	exempt	exempt
New York	4 to 8 ³	exempt N.Y. State taxable N.Y. City	taxable taxable
Pennsylvania	6	exempt	mixed
Ohio	4 to 6 ²	exempt	exempt
Michigan	4	exempt	exempt
Wisconsin	4	exempt	mixed
Georgia	3 to 4 ²	exempt	exempt
Texas	4 to 5 ²	taxable	exempt
California	4 ³ to 6 ²	taxable	exempt

Source: 1977 *Guidebooks to State Taxes*, Commerce Clearing House Inc., (Chicago: 1976 and 1977).

¹The scope of exempt machinery, equipment and materials varies among jurisdictions. For reference to Ontario's exemption, see footnote 1, p. 9.

²Repair and installation labour charges.

³Higher rate is the maximum allowed including local rates.

jurisdictions have chosen to provide ad hoc assistance, most notably through specific inducements such as outright grants, income and property tax holidays, low-cost loans and provision of plant site and/or servicing. Severe competition has developed among jurisdictions. Such explicit competition, if allowed to develop between Canadian provinces or even among municipalities within a province, could be very costly. Regional development strategies are best developed at the national level, with the federal government and the provinces working together within a national framework to make the Canadian investment climate as attractive to investment as their combined fiscal capacity allows. Corporation tax policy in Ontario and in Canada has gone a long way in this direction.

V Assessment of the Retail Sales Tax Exemption Program

As noted in the first part of this paper, the economic assessment of the retail sales tax exemption for production machinery and equipment is complicated by a number of factors which, collectively, limit the potential for documenting definitive results. Nevertheless, every available approach has been pursued and, as indicated, three main routes have been explored. It is their combined weight of evidence which is offered to substantiate the economic benefits of Ontario's retail sales tax incentive. These are presented separately: Part A examines the growth in investment in Ontario under the temporary exemption program from 1975 to 1977; Part B summarizes the econometric results contained in the Institute for Policy Analysis' evaluation of the longer term impacts of the current incentive over the period from 1977 to 1982 (the full Report is appended to this paper); and, Part C presents the results of a survey of corporations dealing with aspects not covered by the econometric analysis. Taken together, they provide considerable insight into the anticipated continued success of the program in promoting economic growth in Ontario by encouraging private sector investment.

A. Growth in Investment in Ontario under the Temporary Exemption, 1975-1977

Since the long-term incentive has been in effect for only one year, it must be recognized that no meaningful investment results are available to date. Under these circumstances, it may be useful to examine the performance of investment in Ontario, and particularly in manufacturing, during the period of the temporary program it replaced. In doing so, however, it must be remembered that the Government of Ontario has been pursuing an expenditure restraint policy since 1976. This policy has had a restraining impact on public sector capital formation and, therefore, has impacted on total capital expenditures. Accordingly, it is essential to separate private from public investment in the analysis.

Table 10 shows *total private and public capital expenditures on new machinery and equipment* in Ontario and the rest of Canada from 1974 to 1977. From this total private/public sector perspective, it is apparent that Ontario's growth in investment has lagged behind that of the rest of Canada.

Total Private and Public Capital Expenditures on
New Machinery and Equipment, 1974-1977

Table 10

Year	Ontario		Rest of Canada	
	(\$ million)	(% change)	(\$ million)	(% change)
1974	4,728		7,383	
1975	5,428 ¹	14.8	8,734	18.3
1976 ²	5,557	2.4	9,455	8.3
1977 ³	6,057	9.0	10,724	13.4

Source: Statistics Canada, Cats. 61-205 and 61-206.

¹Available information indicates that sales taxes are included in the capital expenditure figures. Therefore, since the exemption was introduced in 1975, Ontario's positive performance for that year is biased downward by the amount of the sales tax forgone.

²Preliminary actual.

³Revised intentions.

Ontario's Manufacturing Investment Improves

The Ontario retail sales tax exemption is primarily directed at manufacturing. To determine the effectiveness of the incentive in stimulating investment, it is necessary to examine the investment patterns of this sector, to which the exemption applies most directly. A comparison of private and public capital expenditures on new machinery and equipment in *manufacturing* between Ontario and the rest of Canada is provided in Table 11. The results clearly show a substantially better performance for Ontario in those industries which directly benefitted from the exemption. The bulk of this improvement is in investment by private business.⁷

The figures in Table 11 illustrate that over the three-year period from 1971 to 1974, growth in investment in Ontario manufacturing lagged marginally behind the rest of Canada. Capital expenditures grew by 65 per cent and 67.3 per cent for Ontario and the rest of Canada respectively, a difference of 2.3 percentage points. However, during the three years since the sales tax exemption was introduced, substantial improvement has occurred. Since 1974, private and public investment in new machinery and equipment in manufacturing has grown by 43.9 per cent in Ontario compared to only 19 per cent for the rest of Canada. While it cannot be claimed that the retail sales tax exemption and budget strategy alone have caused this improvement in manufacturing investment, this nevertheless represents a strong relative gain.

**Total Private and Public Capital Expenditures on
New Machinery and Equipment in Manufacturing, 1971-1977**

Table 11

Year	Ontario		Rest of Canada		Spread
	(\$ million)	(% change)	(\$ million)	(% change)	(+) or (-)
1971	1,020		1,101		
1972	1,027	0.7	1,092	-0.8	+1.5
1973	1,263	23.0	1,419	29.9	-6.9
1974	1,683	33.3	1,842	29.8	+3.5
1975	2,123	26.1	1,830	-0.7	+26.8 ¹
1976 ²	2,123	—	1,680	-8.2	+8.2
1977 ³	2,421	14.0	2,192	30.5	-16.5
1974/1971		65.0		67.3	-2.3
1977/1974		43.9		19.0	+24.9 ¹

Source: Statistics Canada, Cats. 61-205 and 61-206.

¹See footnote 1, Table 10.

²Preliminary actual.

³Revised intentions.

Ontario's performance in private and public investment in new manufacturing machinery and equipment was considerably better on a year-to-year basis than that of the rest of Canada during the first two years of the exemption: Ontario outperformed the rest of Canada in 1975 and 1976 by 26.8 and 8.2 percentage points respectively. For 1977, it is estimated that the rest of Canada will outperform Ontario, even though such expenditures in the province are expected to grow by fully 14 per cent over 1976. This partially reflects the impact of the expiration of the temporary program on December 31, 1976, which undoubtedly caused some acceleration of 1977 investment plans. Consequently, the success of the incentive should be judged over the period as a whole.

⁷The public sector share of manufacturing investment is small.

Total Private Capital Expenditures on
New Machinery and Equipment, 1974-1977

Table 12

Year	Ontario		Alberta		Rest of Canada	
	(\$ million)	(% change)	(\$ million)	(% change)	(\$ million)	(% change)
1974	3,829		1,093		4,825	
1975	4,179	9.1	1,255	14.8	5,381	11.5
1976 ¹	4,257	1.9	1,726	37.5	5,299	-1.5
1977 ²	4,811	13.0	2,070	19.9	5,703	7.6

Source: Statistics Canada, Cats. 61-205 and 61-206.

¹Preliminary actual.

²Revised intentions.

Total *private* capital expenditures on new machinery and equipment *across all industries* in Ontario, Alberta and the rest of Canada from 1974 to 1977 are compared in Table 12. The results clearly reveal a considerable improvement in Ontario's position relative to the rest of Canada (excluding Alberta) since the introduction of the temporary exemption. The separation of Alberta's results in the analysis seems reasonable in view of the distortionary effects of energy-related investments on the overall results. For comparative purposes, the growth in the rest of Canada including Alberta for 1975, 1976 and 1977 are 12.1 per cent, 5.9 per cent and 10.6 per cent respectively.

The relatively strong investment performance by Ontario private industry contrasts with a sharp reduction in the growth of public capital spending over the same period. Table 13 shows that growth in *public* investment in machinery and equipment in Ontario fell from 38.9 per cent in 1975 to only 4 per cent during 1976. It is estimated that negative growth will be experienced in 1977. These results reflect the Government of Ontario's strategy of public sector expenditure restraint. By comparison, public investment in new machinery and equipment in the rest of Canada grew considerably over the period.

Total Public Capital Expenditures on
New Machinery and Equipment, 1974-1977

Table 13

Year	Ontario		Rest of Canada	
	(\$ million)	(% change)	(\$ million)	(% change)
1974	899		1,465	
1975	1,249	38.9	2,098	43.2
1976 ¹	1,299	4.0	2,430	15.8
1977 ²	1,247	-4.0	2,950	21.4

Source: Statistics Canada, Cats. 61-205 and 61-206.

¹Preliminary actual.

²Revised intentions.

The trends in private and public investment shown in Tables 12 and 13 are brought together in Table 14. It shows the *percentage shares of private and public* investment in new machinery and equipment in Ontario and the rest of Canada, over the period 1975 to 1977, with comparable average results for the previous five years.

It is apparent that, whereas public sector investment (including utilities) in new machinery and equipment has flattened out in Ontario, it has continued to grow in the rest of Canada. The share of public investment in new machinery and equipment in Ontario decreased during the term of the temporary exemption from 23 per cent in 1975 to an

Private and Public Investment,
New Machinery and Equipment, 1970-1977
(percentage shares)

Table 14

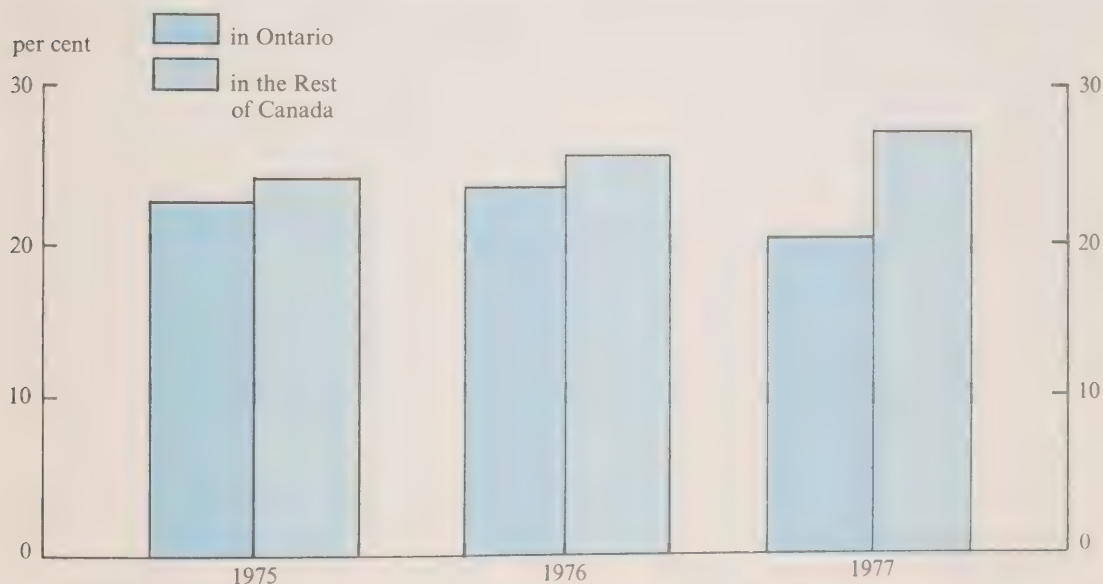
Year	Ontario			Rest of Canada		
	Private	Public	Total	Private	Public	Total
Average						
1970-74	80.2	19.8	100	81.3	18.7	100
1975	77.0	23.0	100	76.0	24.0	100
1976	76.6	23.4	100	74.3	25.7	100
1977	79.4	20.6	100	72.5	27.5	100

Source: Statistics Canada.

estimated 20.6 per cent in 1977, whereas the share of private investment increased to 79.4 per cent from 77 per cent. And, although the private sector share is still marginally below the average for the 1970 to 1974 period, the share has improved considerably since 1975. By comparison, figures for the rest of Canada show a substantial increase in the share of public investment from 24 per cent to 27.5 per cent, and a corresponding decline in the private share from 76 per cent to 72.5 per cent over the same period. Moreover, this declining performance compares with an average private sector share of 81.3 per cent over the 1970 to 1974 period.

Public Sector Share of Total Investment in Ontario
and the Rest of Canada, 1975-1977

Chart 2



Source: Statistics Canada.

These results do not reveal the relative merits of private versus public investment in the rest of Canada, nor does this analysis include a project-by-project examination. However, given the significant reduction in the share of private investment which took place in the rest of Canada over the period, there is reason to believe that, had the Ontario

Government not taken appropriate action, a similar trend might have occurred in the province. Clearly, the evidence is supportive of the view that the Government's fiscal restraint and the retail sales tax exemption program have been instrumental in restoring a more appropriate balance between private and public investment in Ontario over the past several years.

B. Econometric Assessment of the Long-Term Exemption, 1977-1982

While a retrospective analysis of the growth in private sector investment during the period of the temporary exemption is useful and informative, it does not come to grips with the specifics of the way in which a long-term sales tax exemption works its way through the economy. The corporate reaction functions are different in the two situations. As well, a long-range economic forecast is essential to test the longer run impacts of the new program.

The Institute for Policy Analysis, University of Toronto, was asked to undertake a detailed study of the direct and indirect multiplier effects of the retail sales tax incentive on employment, investment, output and prices. The Institute's Report, entitled "*The Economic Impacts of Ontario's Retail Sales Tax Exemption for Production Machinery*", is reproduced in its entirety as an Appendix.

In its study, the Institute employs a large-scale econometric model of the Canadian economy, and adjustments are made to distinguish the Ontario economic aggregates within the national totals. The retail sales tax exemption is registered in the model as a reduction in the final price of production machinery and equipment.⁸ A long-range economic forecast for the period 1977-1982 is used to analyze the effects of a drop in the price of capital goods over the longer term. Overall, the forecast calls for a modest resurgence of growth, a gradual abatement in inflation, and unemployment to decline. This outlook, which is certainly not optimistic by historical standards, is relatively neutral in terms of its impact on the analysis.⁹

Table 15 summarizes the gradual recovery portrayed for the Canadian economy by the Institute.

Long Range Economic Forecast, 1978-1982
(per cent)

Table 15

	1978	1979	1980	1981	1982
GNP (1971 dollars)	4.8	5.0	5.2	5.7	5.0
Prices (GNP Price Deflator)	7.0	6.8	6.6	6.5	6.5
Unemployment Rate	8.2	8.0	7.7	7.3	6.9

Source: Institute for Policy Analysis.

Direct and Indirect Economic Effects

The Institute begins its analysis by pointing out that the retail sales tax exemption has the effect of reducing the price of production machinery and equipment to those firms affected by the measure, and expects that the following responses will occur:

1. The affected firms will attempt to substitute production machinery for the now relatively more expensive production labour.

⁸While the front-end reduction in the cost of machinery and equipment is seven per cent, the final net saving is somewhat smaller because capital cost allowances for income tax purposes are reduced.

⁹G. V. Jump and D. P. Dungan, *op. cit.*, p. 41.

2. These same firms will attempt to increase production facilities and production levels.
3. New firms will be drawn into the affected industries and production will expand further.
4. Higher production levels will force output prices of affected industries downwards.

It is important to note that the economic model employed by the Institute has certain limitations, insofar as it is unable to quantify all of the economic impacts attributable to the retail sales tax exemption. One limitation is that the model does not capture the total increase in investment in machinery and equipment arising from the resulting reallocation of industry. Since the movement of firms to Ontario would generate only positive economic results, the figures for Ontario appearing in the Report tend to be understated. A second and probably more important factor that the model fails to capture is the generally positive effects of the incentive on the investment climate and investors' confidence. As the Report explains, investment decisions are influenced to a large degree by investors' expectations of the future and their views on government attitudes toward business. Evidence of the significance of such intangibles is revealed in the corporation survey results which are discussed later. These results indicate that the combined impact of the Ontario Government's fiscal policy and the tax incentive on business attitudes has been strongly positive. Judged on this basis, it is reasonable to assume that the Institute's quantitative results underestimate to some degree the total economic impact of the sales tax exemption.

The four responses outlined above constitute what the Report describes as the "direct" impacts of the exemption. The first three responses will effectively increase the *real* level of investment in new plant and equipment. This effect will be the greater the more readily firms are able to substitute machinery for labour. The Institute's analysis uses an elasticity of substitution of 1.0, which in essence means that machinery and labour are close substitutes. The elasticity of substitution employed in the model is quite high in comparison with other econometric models. However, the Report points out that "the history of the Canadian economy is compatible with an elasticity of substitution equal to 1.0"¹⁰, and the Authors feel that the FOCUS model will produce reasonable and realistic estimates of the direct impacts on this basis.

Turning to what the Report describes as the "indirect" impacts of the exemption, it is important to note that it is referring to the multiplier effects stimulated by the direct expansion of income created by the tax reduction. These effects are so large that the Institute can conceive of no alternative policy which would produce comparable results: "If the Ontario Government's objective was to get the maximum impact on provincial output per dollar of revenue loss, then it appears that they have chosen the right course of action."¹¹

A Summary of the Quantitative Results

The results contained in the Report for the forecast period are presented below.

The Benefit-Cost Ratio is High

The Ontario benefits and costs of the retail sales tax incentive are provided in Table 16. This Table shows the net revenue cost to the Government of the tax exemption, after accounting for feedbacks in general revenue resulting from its total economic effects. These feedbacks were calculated by measuring the general responsiveness of

¹⁰ *Ibid.*, p. 47.

¹¹ *Ibid.*, p. 50.

Summary of Benefits and Costs, 1977-1982
(\$ million)

Table 16

	1977	1978	1979	1980	1981	1982
<i>Benefits: Increase in Ontario GDP¹</i>	211	342	442	508	556	658
<i>Cost of Incentive²</i>						
Retail Sales Tax Forgone	157	178	207	241	285	324
Less: Feedback Revenues	29	45	58	67	73	86
Net Cost	128	133	149	174	212	238
<i>Benefit-Cost Ratio</i>	1.65	2.57	2.97	2.92	2.62	2.76

Source: Ontario Treasury Estimates.

¹Increase in Ontario real Gross Domestic Product reported by the Institute for Policy Analysis multiplied by the projected aggregate price index.

²While it is mathematically possible to analyze employment creation costs on a per-job basis utilizing the Institute's employment results and the revenue loss projections, such results are superficial at best. They measure neither the sustained economic benefits resulting from the increase in capital per worker, improved productivity and price performance beyond 1982, nor the output and employment gains from immediate improvements in the investment climate, both of which clearly reduce per-job costs significantly.

Provincial budgetary revenue to output growth, and applying this measure to the Gross Domestic Product gains predicted on the basis of the Institute's results. These results are highly positive throughout the 1977 to 1982 period, and substantially reduce the net cost of the program. The benefit-cost ratio is much higher than the multiplier and is never below 1.65 during the period as a whole. Indeed, it rises from this level initially to a peak of 2.97 in 1979. As well, the estimated benefits are understated because they do not include the beneficial spillover effects to the rest of Canada. It will be shown that these spillovers are substantial.

Investment is Stimulated

Table 17 shows that the impact of the retail sales tax exemption on business expenditures on new plant and equipment produces a considerable expansion in capital stock, particularly during the later years of the forecast period. The net new additional investment in plant and equipment increases steadily from \$57 million in 1977 to \$423 million in 1982.

Total Net Impact of the Production Machinery Exemption on the Level of Business Investment in Ontario, 1977-1982
(\$ million)

Table 17

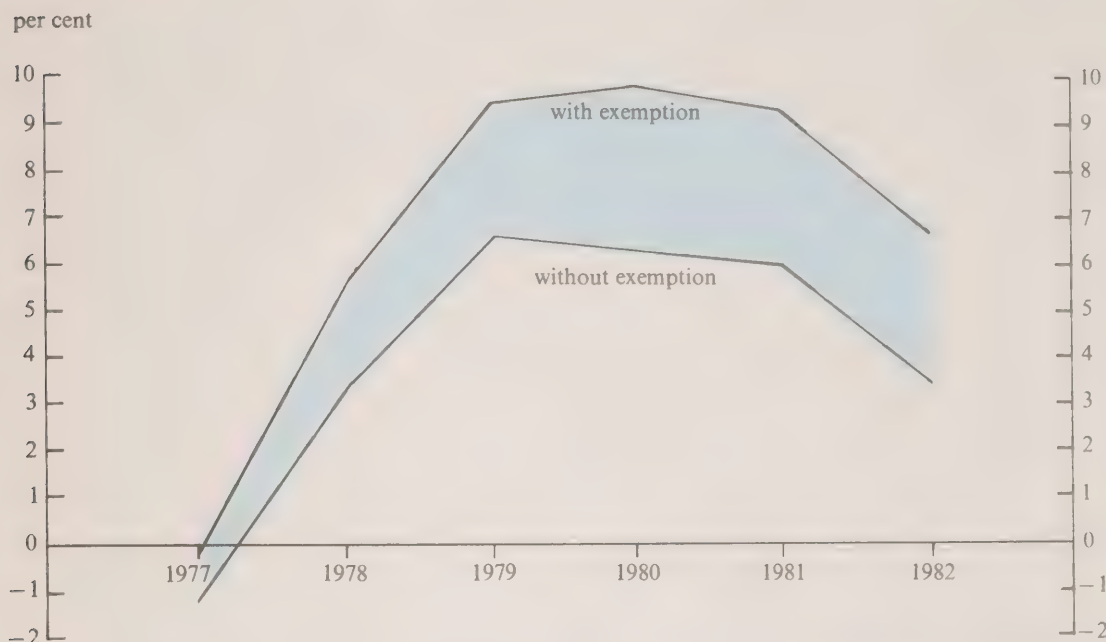
	1977	1978	1979	1980	1981	1982
Increased Investment in New Machinery and Equipment	55.2	131.0	171.4	232.7	304.5	354.8
Increased Investment in New Non-Residential Construction	1.4	25.0	58.7	77.6	79.7	68.2
Total Net New Investment Created by the Incentive	56.6	156.0	230.1	310.3	384.2	423.0

Source: Institute for Policy Analysis.

Chart 3 shows projected real investment in percentage growth terms, both with and without the retail sales tax exemption. Investment growth is increased in every year by the tax exemption: the smallest increment is the one percentage point added in 1977 (−0.1 per cent compared to −1.1 per cent) but the net additional growth in investment rises

Real Business Investment in New Machinery and Equipment, Ontario, 1977-1982

Chart 3



Source: Institute for Policy Analysis.

quickly to three percentage points by 1980 (9.5 per cent compared to 6.5 per cent). It exceeds three points for the remainder of the forecast period.

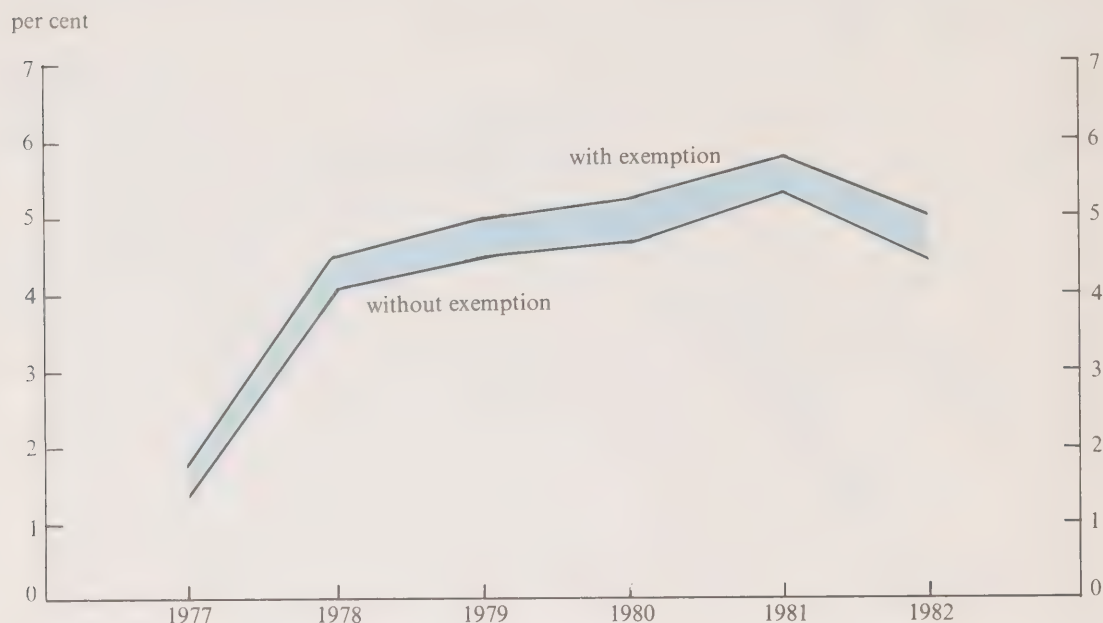
These investment results are a welcome finding, since they are consistent with the Government of Ontario's objective of increasing production facilities and output, and improving the province's competitive position in both domestic and foreign markets.

Expansion of Output is Considerable

The net additional investment generates an expansion in output. The implied real multiplier of the tax exemption on provincial Real Domestic Product (RDP) is very large, and the magnitude of the multiplier rises over time. In essence, the significance of this result is that, given a multiplier of 1.35 as is the case for 1977, the provincial RDP increases by \$1.35 for every \$1 in production machinery taxes given up in the same year. In 1979, for example, the multiplier is calculated at 2.15, which indicates the significant impact the exemption will have on provincial output per dollar of gross revenue loss. As noted earlier, the Institute concludes that, in view of the size of the multipliers arrived at in the forecast, the Government could not have chosen an alternative tax policy that would have had such a significant impact on provincial output per dollar of revenue loss. Chart 4 shows that Ontario's Gross Domestic Product growth is increased by more than one-half of one percentage point in each of the years 1979 to 1982.

The Productivity of Labour is Enhanced

The Institute's results show that the tax incentive will serve to enhance labour's productivity. This is most significant in view of the fact that figures supplied by Statistics



Source: Institute for Policy Analysis.

Canada indicate that employment in Ontario's manufacturing industry has declined by approximately 3.2 percentage points since 1974.¹² An explanation for this trend is offered by Pitfield, Mackay, Ross & Company Limited, who suggest that Canadian manufacturing has been increasingly priced out of the Canadian market and that imports of manufactured products have steadily displaced domestically produced goods.¹³ The Institute suggests that the tax incentive will have the effect of increasing labour's productivity by up to 0.6 per cent annually for the whole of Ontario. The productivity improvements are even greater in those industries which benefit from the production machinery exemption:

"... we should expect to find that labour's productivity in these industries has risen by $2\frac{1}{2}$ to 3 times the amount shown for the entire province. At a time when Canada's productivity relative to that of our international trading partners is an issue of some concern, this is a welcome finding. All the more so considering that Ontario's manufacturing industry is both a key issue in this concern and a major beneficiary of the Provincial tax exemption."¹⁴

Given this increase in the productivity of labour, especially in Ontario's manufacturing industry, the recent negative employment trend in this important industry could be halted. In fact, the Institute's findings show a positive growth in employment in manufacturing during the latter part of the forecast period.

Price Inflation is Ameliorated

The Institute projects that the tax exemption will bring about a reduction in the Gross National Product price deflator, which is reduced by an average of over 2/10 of a percentage point annually and by almost 4/10 of a point in 1978 alone. Similar improvement occurs

¹²Statistics Canada, Cat. 71-001, and unpublished information.

¹³Economics Department, Pitfield, Mackay, Ross & Company Limited, *Economic Review* (Toronto: November 18, 1977).

¹⁴G. V. Jump and D. P. Dungan, *op. cit.*, p. 49.

in consumer prices, as the projected level of the Consumer Price Index is lowered by an average of 1/10 of a percentage point for each of the forecast years.

Employment Growth is Boosted

In its quantitative analysis of the impact of the incentive on employment, the Institute's results show substantial job gains over the 1977 to 1982 period. These results, summarized in Table 18, project a cumulative gain of over 70,000 man-years in Canada by 1982 alone. This substantial job creation reflects the large increase in total Canadian economic output generated by the econometric model when a percentage reduction in the cost of production machinery and equipment equivalent to Ontario's retail sales tax exemption is simulated.

Generated Output and Employment, 1977-1982

Table 18

	1977	1978	1979	1980	1981	1982
<i>Gross Domestic Product</i> ¹						
	(\$ million)					
Ontario	210.9	342.3	441.8	507.7	556.4	658.2
Rest of Canada	201.7	359.8	365.6	280.0	189.0	236.0
Total	412.6	702.1	807.4	787.7	745.4	894.2
<i>Employment</i>						
	(persons)					
Ontario	-3,770	-6,078	414	8,609	11,864	9,032
Rest of Canada	5,275	12,635	13,484	9,861	4,980	3,512
Total	1,505	6,557	13,898	18,470	16,844	12,544

Source: Institute for Policy Analysis.

¹See footnote 1, Table 16.

Ontario is initially allocated approximately 55,000 of these jobs in proportion to the province's share of the increased output. However, in the limited time horizon examined by the model, the substitution of capital for labour—which has a negative impact in the first two years—reduces this figure to 20,000 net new jobs for Ontario over the period of the forecast. It is evident from the trends in Table 18 that the province's share of the economic impact of the tax incentive in terms of output and jobs grows very quickly to a dominant position. Thus, over the longer term, the bulk of the benefits flow to Ontario.

The substitution effect assumed by the Institute is very substantial. It assumes that there are few technological or institutional obstacles to the full replacement of capital for labour on a dollar-for-dollar basis. The structure of the Ontario economy is highly capital intensive, and some substitution in favour of capital obviously occurs. Indeed, this is desirable if the Government's fiscal strategy is to have maximum beneficial impact. For all practical purposes, however, the 20,000 net new jobs allocated to Ontario must be regarded as an absolute minimum in terms of the quantitative results. Further, as the Institute acknowledges, the quantitative results themselves understate the real job impact of the incentive in Ontario for the following reasons:

- the model makes no allowance for the non-quantifiable yet unambiguously positive impact of the incentive on investor confidence and attitudes; and,
- the Ontario projections, being a scaled-down version of national totals, make no allowance for employment gains resulting from the in-migration of firms.

The Authors suggest that the impact of these factors could quite easily offset the negative employment impacts shown in Table 18. This being the case, it can be argued that even over the incomplete time period studied, at least one-half of the total 70,000 new jobs

created will be put in place in Ontario. Beyond 1982, Ontario's share of the new employment would continue to increase.

Spillover Effects in the Rest of Canada

The stimulative impact of Ontario's fiscal actions in other regions of Canada can be considerable in view of the open nature of the Canadian economy and the importance of interprovincial trade. Table 18 outlines the effect of Ontario's tax exemption program on real Gross Domestic Product and employment for both the province and the rest of Canada.

The figures in the Table show that, in terms of output and employment, the exemption produces very significant spillover stimuli to the Canadian economy over the whole period. However, it is apparent that in the longer run the major share of the effects are retained in Ontario. The extent of the gains in Ontario's output growth (which were shown in Chart 4) clearly illustrates the significance of the increments directly attributable to the exemption: the Gross Domestic Product and employment gains are equally significant in the rest of Canada. This spillover of benefits reaffirms the importance of Ontario's fiscal policy in a national context.

C. Corporate Attitudes Toward the Production Machinery Exemption

The Institute's detailed analysis of the retail sales tax incentive demonstrates conclusively that its effect on investment, employment and output will be positive over the medium and long terms. It also has beneficial feedback effects in terms of reduced prices and some generated increases in other government revenues which offset its initial cost. The magnitude of the economic impact of the incentive estimated by the Institute is, of course, sensitive to the structure of the FOCUS model, the economic forecast employed and a number of other factors. Nevertheless, as discussed earlier, the Institute's analysis is very detailed and comprehensive, and it represents an accurate assessment of the economic impact of the exemption within the limitations which apply to all such econometric analyses.

Since econometric analyses deal only with quantifiable effects, the Institute's results do not include any assessment of the impact of the Province's overall fiscal strategy nor of the tax incentive on business confidence and the location of industry. These are important omissions. As the Authors note in their Report:

"The reader should be aware that our analysis has dealt only with easily quantifiable effects. Impacts of the tax exemption on such intangibles as investors' confidence and the investment climate in Ontario have been ignored. Investment decisions depend every bit as much upon investors' expectations of future market and policy developments as they do upon current price and profit conditions. In this sense the intangibles are important elements of the decision process. It seems clear that if the tax exemption has had any impact upon these intangible factors, it has been in the positive direction."¹⁵

The fleshing-out of the Institute's broad quantitative results requires a first-hand evaluation of the effect of the tax incentive on corporate decision making and the motivation to invest. To expedite this evaluation, the cooperation of industry Associations was sought and brought forth a substantial sampling of corporations' opinions -with examples of actual investments and the associated job creation. Since the thrust of the exemption is directed at manufacturing, attention was focused on this sector.

¹⁵G. V. Jump and D. P. Dungan, *op. cit.*, p. 52.

Of greatest significance is a survey of 160 member companies conducted by the Canadian Manufacturers' Association (CMA). Fifty-two of its members chose to respond, providing significant insight into the corporate attitude towards tax incentives and the scope and nature of qualifying investments. As previously noted, the short period since the introduction of the new program required that the surveyed firms be asked to consider the impact of the similar, temporary exemption over its term. Forty-nine companies reported the specifics of their new investments over the period and, overall, they reported investments in new plant and equipment totalling almost \$1.7 billion. This represents 22.1 per cent of total new manufacturing investment over that same period and, as such, should reflect fairly well the attitudes and actions of the entire manufacturing sector. Of these 49 firms, 39 chose to discuss the impact of these investments on employment, and reported a total of 4,210 positions maintained or created during that same period, as well as thousands of additional construction and professional man-years during the design and implementation phases of these projects.

Unfortunately, there is no acceptable basis upon which these results can be extended to provincial economy-wide totals with any degree of certainty. Nevertheless, if these manufacturing concerns are representative of others in the sector (that is, if capital-labour ratios are similar within the various categories of manufacturing), then the new employment associated with total new investment over the term has been over 19,000 in manufacturing alone. *This represents almost $\frac{1}{2}$ of 1 percentage point of Ontario's unemployment rate.* The multiplier effects on economic activity from sustained employment gains, as documented by the Institute, take on greater significance when considered in conjunction with the reality of these investments.

Significantly, the investments quoted by the respondents are as diverse, both in geographic location and in size, as are the firms themselves. From Fisher Gauge Limited, a small manufacturing concern in Peterborough which invested \$200,000 and created 10 new jobs, to an investment of almost \$175 million with 260 new jobs in Sarnia by Union Carbide Canada Ltd., and even larger projects by other companies, the incentive has been available to and utilized by firms of every size and description in formulating spending plans.

The geographic distribution of the investments is reassuring in that it suggests that the benefits of such incentives find their ways to all parts of the province. In fact, fully 63 per cent of the new investments reported fall outside the "Golden Horseshoe" area, a percentage well in excess of that predicted by the current regional distribution of Ontario manufacturing.

The reporting firms do indicate, in some cases, replacement of labour with capital goods, as predicted in the Institute's Report. However, this substitution is extremely small relative to total employment in the province. Much more prevalent is the decision to undertake new expansion or to win new investments which would otherwise have gone to neighbouring United States jurisdictions. The size of these impacts far exceeds the substitution effects.

These impacts are indicative of the effects on investment climate, investor confidence and hence the corporate decision making process, which were referred to by the Institute as difficult to assess. The corporate decision to invest in new plant and equipment is a multi-faceted yet remarkably straightforward process. Reduced to its basics, it consists of establishing the presence of a market for the product, and assessing the ultimate rate of return of alternative plant locations each within the constraints of the associated investment climate. The impact of retail sales tax incentives on this process is two-fold — the obvious link between reduced taxes and an improved rate of return on investment

through reduced cash flow requirements, and the qualitative effects on the investment climate and attitudes as perceived by the corporation. In specifying the impact of the incentive, it was these two themes which dominated the corporate responses.

Illustrative of the first type of impact are the comments of Canadian General Electric Company Ltd.:

"... one by one, government measures, which help to reduce costs, help in investment decisions. One of the key criteria in evaluation of investments in capital projects in our Company is the cash flow payback. Removal of the Ontario sales tax improved the cash flow performance and, no doubt, figured favourably in the approval process."

Allen-Bradley provided similar input:

"The removal of the sales tax helped to justify capital projects that we had planned because it made the equipment less costly and hence easier to demonstrate the economic payback on additional production equipment. Justification may have been impossible at a higher cost. Since Allen-Bradley participates extensively in the capital goods market, our business has improved and we anticipate further improvement because incentives such as this have made capital goods less costly than they would otherwise have been."

Referring to their specific expansion, Johnson Matthey & Mallory Limited noted:

"It can be positively said that the economic justification for this project was very tight. Had an additional 7% been added to the equipment cost, there is the possibility that the whole project might not have proceeded."

Fahramet Limited noted:

"If this Tax had not been removed we would have been forced to spend less than budget and in fact defer major modernization expenditures. Due to the impact on R.O.I. (return on investment) since foundries continue to be low profit operations, we are extremely sensitive in this area."

From Doehler Canada Ltd.:

"The extra 7% increase on the capital cost would have reduced the economic viability of some of our capital expenditure projects to a degree where the project would have been rejected due to a poor economic return on the proposed investment. The result would have meant equivalent capital dollars could have been spent in the United States by our parent company.

"Certainly sales tax is not the only factor influencing the decision as to where capital spending will be made, however, in our instance inclusion of sales tax could have adversely affected the decision to replace and repair equipment involved in one of our major product lines. If the decision had been negative, it would have seriously affected our business in this province and our level of employment."

Even industries within the manufacturing sector which are eligible for very little exempt machinery acknowledge the impact that such a measure has on their cash flow. In the petroleum industry, for instance, Gulf Oil Canada Ltd. states that:

"The Ontario sales tax exemption is usually quite small in relation to the total construction costs of any project. However, all such tax incentives, whether sales tax or income tax, do combine to improve the cash flow and could, in some instances, be sufficient to improve the discounted cash flow rate of return enough to allow a project to be approved."

Texaco Canada adds:

"The removal of the Ontario Sales Tax in April, 1975 did indeed influence our company's decision to maintain our then current level of capital spending. The tax exemption was not and could not be the sole, nor even the dominant, factor in the decision to invest over \$400 million in one project. The exemption was, however, a significant factor and certainly encouraged the company to proceed with the refinery."

Finally, Fisher Gauge Limited expressed quite succinctly the general perception of the financial impact of such measures on investment decisions:

"We are a small Canadian company with operations in both Ontario and the United States. One manufacturing plant in Peterborough, Ontario, has an identical capability to one located in New York State. Each time we need to make an incremental expansion in capacity, a decision has to be made as to whether to expand in Peterborough or in New York. The three principal considerations in making that decision are the rate of exchange between Canadian and American currency, the differentials in labour costs, and the differences in taxes as they affect cash flow and net income after taxes.

"With regard to the latter consideration, we find it slightly more advantageous to make capital expenditures in New York State. This is largely because of the significant advantage in New York resulting from the Investment Tax Credit. If the Ontario Sales Tax were to be reimposed on manufacturing and production equipment, the disadvantage would be increased to the extent of 7%.

The second and equally important effect of implementing the permanent exemption for production machinery is that it reflects a positive attitude on the part of the Ontario Government towards new investment, by removing the uncertainty associated with the state of flux in tax treatment over the past few years. In doing so, it confirms Ontario's desire to allow the private sector to spearhead the province's economic growth by limiting the obstacles to private capital formation. As such, it complements the Province's balanced budget strategy. At the same time, it facilitates in offsetting some of the other competitive disadvantages documented elsewhere in this paper. The program's success in this respect is clearly reflected in the comments by CMA respondents.

From Canadian General Electric:

"Ontario manufacturing companies are faced with severe foreign competition in both the domestic and international markets. Contributing to the competitive problem are steadily rising costs and unsatisfactory productivity levels, problems which must be dealt with effectively if adequate levels of business growth are to be achieved.

"The response of the provincial and federal government in these areas has been encouraging. There are several programs in place including the Ontario sales tax exemptions on production machinery, accelerated write-offs for manufacturing and processing equipment available both for federal and provincial tax purposes, federal and provincial investment tax credits, and the federal tax reduction on manufacturing and processing profits. Taken together, these measures provide an impressive package of financial assistance to the manufacturing industry in Ontario. Combined, these measures have made a positive impact on investment decisions."

"... There are many factors which enter into the decision of where to locate manufacturing facilities. The cost of the equipment is only one of them, though an important one. The environment in which an enterprise has to operate is of great importance. Measures such as (the retail sales tax exemption) help to create a healthy environment, which encourages corporate investments."

"... The benefits of expanding and upgrading of manufacturing facilities on employment are both direct and indirect and cannot always be readily measured in short term. In the long term, without new investments, Canadian manufacturing will decline and will be unable to provide the jobs which this Province and Canada need."

From Dominion Foundries and Steel, Ltd.:

"I would like to emphasize that as businessmen we are competent to cope with business risks and the swings in economic cycles. In the past few years, however, we have been faced with an entirely new dimension—the unpredictability of government legislation and regulation. If an economy is to plan and prosper, government should be doing everything it can to minimize instability rather than aggravate the condition by an on-again off-again approach to taxation."

Clearly, then, the incentive has been productive, both in terms of solid macroeconomic impact and improvement in the investment climate in Ontario. The overall importance of the incentive in these respects was perhaps best summarized by Rubbermaid (Canada) Ltd. in its response to the CMA survey:

“It would likely be difficult for anyone to treat the removal of the Sales Tax in isolation and point to it as the single incentive that created capital spending and/or jobs. The decision to create capital formation and invest in production facilities is made up of many factors—one major factor being taxation of all descriptions. If the sum total of the advantages and disadvantages in creating capital appear feasible to the point where the risk is acceptable, then the decision is usually made to invest.”

Other Associations were contacted; the Automotive Parts Manufacturers’ Association of Canada (APMA) undertook a somewhat less detailed approach in surveying its members. In spite of the lack of hard data, however, industry members report impacts on rate of return, cash flow, investment climate and investment decisions much in the same context as suggested by the CMA survey. Specifically, of 17 reporting firms, 14 report the exemption as a factor in the investment decision making process, 14 report an impact on cash flow and rate of return, 11 report the creation or saving of jobs, and six imply an impact on plant location decisions. The solid beneficial impact of Government action was further confirmed by the APMA in a January, 1978 submission to the Government of Ontario:

“In the past three years the government has moved to eliminate many of the direct taxes on investment which were represented by the 7 percent sales tax on production machinery and equipment, the land transfer tax and the availability of loans in high-density areas of Ontario. Along with the measures introduced in the 1977 budget—the continuation of the fast write-off provision and the three percent inventory valuation adjustment—the position of Ontario as an attractive place in which to invest has been vastly improved.”¹⁶

¹⁶Automotive Parts Manufacturers’ Association of Canada, *Economic Outlook, a Submission to the Government of Ontario* (Toronto: January, 1978) p. 3.

Appendix

The Economic Impact of Ontario's Retail Sales Tax Exemption for Production Machinery

A Report Prepared for the Taxation and Fiscal Policy Branch,
Ontario Ministry of Treasury, Economics
and Intergovernmental Affairs

by

Gregory V. Jump,
Associate Professor and Research Associate

and

D. Peter Dungan, Research Associate

Institute for Policy Analysis
University of Toronto

December 1, 1977

1 Introduction

In November, 1976 the Treasurer of Ontario introduced a new long-term production machinery exemption to that Province's Retail Sales Tax Act. The exemption, which became effective on January 1, 1977, eliminated the seven per cent retail sales tax on all private machinery and equipment which by its specific function alters goods in process. It was also made applicable to a wide variety of mining, logging, waste removal and pollution control equipment.¹

Based on estimates provided by the Taxation and Fiscal Policy Branch of Ontario's Ministry of Treasury, Economics and Intergovernmental Affairs, equipment subject to the exemption will account for \$2,236.8 million, or 36.9 per cent, of total private investment anticipated for Ontario during 1977.² The revenue loss to the Province is expected to be nearly \$160 million during the first full year of the exemption.

This policy is expected to provide rather substantial incentives to increased investment in Ontario over the medium-term future. The nature of the incentives is easily identified: firms subject to the exemption will pay lower prices for new machinery and equipment³ an effect which should act to stimulate their demands for new capital equipment. Since the after-tax cash flow position of such firms has been favourably affected by the tax reduction, the wherewithal to finance additional capital accumulation has also been provided in whole or in part.

To the extent that these incentive effects are actually realized, the levels of production and employment in Ontario will also be affected by the tax exemption. Clearly any increase in capital formation will add to the productive capacity of the provincial economy. This will presumably lead to levels of actual production which are higher in the future than might otherwise have occurred had the exemption not been granted. The direction of the effect on future levels of employment is less obvious. By making capital goods a more attractive means of production, the tax exemption should induce some firms to substitute production machinery for production labour—an effect which, by itself, would act to reduce the future rate of growth of provincial employment. However, this substitution effect will be counteracted by any increase which occurs in provincial production: higher production levels will require higher labour input. The net impact of the exemption on future employment levels cannot, therefore, be predicted *a priori* without some further analysis of the relative sizes of these two effects.

The objective of this study is to give quantitative substance to these impacts. More specifically, we seek to determine the likely impacts of the sales tax exemption on the following variables in Ontario over the period 1977-1982:

1. the level of business investment in new machinery and equipment;
2. the level of business investment in new construction;
3. the level of provincial Real Domestic Product; and,
4. the level of provincial employment.

¹For detailed information concerning the items subject to exemption see *Information Bulletin No. SP2-77*, Retail Sales Tax Branch, Ontario Ministry of Revenue (August, 1977).

²This estimate is based on expenditure intentions contained in *Private and Public Investment in Canada: Mid-Year Review 1977*, Statistics Canada Catalogue No. 61-206, Annual.

³This is true whether or not the equipment utilized by Ontario firms is purchased from producers outside the province. The retail sales tax is, in effect, a use tax. It is paid by all firms in Ontario, even when equipment is imported from other provinces or from abroad. Hence exemption of certain classes of equipment from the sales tax acts like a subsidy to Ontario users of those classes of equipment.

In addition, we seek to obtain estimates of the impacts of the exemption on the following economy-wide macro-economic variables over the same time period:

1. the levels of aggregate GNP and Real Domestic Product; and,
2. the overall rate of price inflation.

The methodology used in the study is simulation analysis with a large-scale econometric model. The model used is the FOCUS quarterly macro-econometric model of the Canadian economy, developed and maintained at the Institute for Policy Analysis, University of Toronto. Insofar as the FOCUS model does not explicitly distinguish the Ontario economy from the overall Canadian economy, analysis with the model is supplemented by an input-output analysis designed to do precisely that.

The methodology is described in some detail in the next section of this paper. Suffice it to note here that the essence of simulation analysis is comparison of alternative model solutions, where the solutions are designed to isolate the impacts of selected policy changes. For the case at hand we first prepared a model solution which represented a forecast of both the Canadian and Ontario economies for the period 1977 through 1982. The assumptions underlying the forecast take the Ontario sales tax exemption into account. This forecast served as our “control solution”. It was then compared with an alternative solution based on the assumption that the Ontario sales tax is reimposed. Differences in the two model solutions constitute estimates of the impacts of the tax exemption.

The control solution is described in Section 3 of this paper, and the main simulation results are presented in Section 4. The study concludes in Section 5 with a discussion of the limitations of the overall findings. A brief summary of the FOCUS model and associated input-output analysis is appended (Appendix A). A breakdown of the estimated value of the tax exemption by industry is shown for 1977 in Appendix B.

2 Summary of the Methodology

The actual effects of the sales tax exemption over the medium-term future cannot, of course, be predicted with absolute certainty. The size of those effects will depend upon, among other things, the overall economic environment which prevails during the next several years. It is important in deriving estimates of the likely impacts of the exemption that we conduct the analysis within the context of a reasonable estimate of what the overall economic environment will be during the 1977-1982 period.

In the language of simulation analysis, we must be concerned that our simulation experiments “control” for a reasonable economic environment; otherwise we run the risk of obtaining unreasonable estimates. One way to keep that risk low is to conduct the experiments about a control solution which represents a widely-accepted view of what the economy will be like over the solution interval. This is the course of action we have taken.

Specifically, we have chosen as our control solution a forecast of the Canadian economy prepared and distributed by Data Resources of Canada.⁴ The FOCUS model was adjusted to exactly replicate this forecast on a quarter-to-quarter basis for some thirty-two aggregate variables over the entire 1977-1982 time period. As noted earlier this control solu-

⁴Data Resources is a private company engaged in preparing and marketing macro-economic forecasts of the Canadian economy on a quarterly basis. The specific Data Resources forecasts used for our control solution are MINIBUD1024 for the 1977-1980 interval and CONTROL0715 for the 1981-1982 interval.

tion is described in detail in Section 3. We need comment here only on the following two features:

1. The outlook embodied in the solution shows a rather modest performance for the national economy over most of the solution period. The overall economic environment is rather poor by historical standards.
2. The outlook presented, at least for the first few years, is quite similar overall to recent forecasts made by the Conference Board in Canada and certain of the major Canadian chartered banks.

The solution is close to what appears to be a consensus of the major forecasting organizations in Canada. This is not to say that no one will object that the control solution is an unreasonable forecast in one respect or another. But, except for the most optimistic or pessimistic of forecasters, any such objections are likely to be qualitative rather than quantitative in nature.

The control solution thus obtained applied only to the national economy. The next step was to obtain an analogous forecast for the Ontario economy. This was done in the following manner:

1. Aggregate industrial distributions of production and employment were obtained by passing solution values for components of aggregate demand and aggregate employment through an input-output matrix. The result was a breakdown of real domestic product (RDP) and employment for twenty-two industrial classifications. The breakdown was achieved in such a manner that the sum of RDP across all industries was constrained to equal aggregate RDP from the FOCUS control solution. Similarly, the sum of employment across all industries was constrained to sum to total employment in the FOCUS control solution.
2. Next, the industrial RDP values were passed through an Ontario-shares vector in order to obtain forecast values specific to Ontario. The resulting figures show Ontario RDP for the twenty-two industries and for the total provincial economy (obtained by summing across all industries). Total employment in Ontario was then estimated by applying the Ontario-shares matrix to industrial employment and summing across all industries within the province.⁵
3. Finally, forecasts of business investment in Ontario were obtained by applying constant investment-share ratios to the FOCUS control solution values for economy-wide capital formation. Business investment in new machinery and equipment for Ontario was estimated by multiplying the economy-wide aggregate by 0.3631 (= Ontario's share of the total for 1977 as revealed in *Private and Public Investment in Canada: Mid-Year Review 1977*). Business investment in new construction in Ontario was computed as the economy-wide total $\times 0.2474$ (= Ontario's share for 1977 from the same source).

The FOCUS control solution and associated solution for Ontario represent *ex ante* forecasts which take the Ontario production machinery exemption into account. The simulation experiments involved reimposing this sales tax: a second solution was generated with the FOCUS model with all assumptions identical to those of the control solution, except that the sales tax exemption was assumed not to be in effect over the 1977-

⁵An intermediate step in this final computation enabled us to obtain estimates of Ontario employment for each of the twenty-two industries. These detailed estimates were derived from a series of strong assumptions concerning the nature of the production process. We attach less confidence to them as forecasts of the likely course of future events than we attach to other of the variables (including total provincial employment) involved in the control solution. We decided, therefore, not to include them in the final report. This decision in no way affected our simulation results.

1982 period. This was done by changing relevant parameters within the model in such a way as to increase the average selling price of machinery and equipment throughout the economy by 7 per cent $\times 0.369 \times 0.3631$ (= Ontario sales tax rate \times fraction of Ontario M&E investment affected \times ratio of M&E investment in Ontario to total M&E investment in the aggregate economy). Indirect tax receipts were also adjusted to reflect the fact that reimposition of the tax would generate higher Provincial revenues. The model was, of course, re-solved after these adjustments were made in order to permit feedback and multiplier effects to operate.

Differences between solution values of variables in the model were then computed in order to measure the economy-wide impacts of the tax exemption. For example, subtracting the values for total employment in the second solution from those in the control solution provided estimates of the impacts on aggregate employment in all of Canada. These estimates, along with those for other economy-wide variables of interest, are reported in Section 4.

What remained after the second solution was obtained was the task of distributing the economy-wide impact estimates between Ontario and the rest of Canada. This turned out to be the most difficult part of the analysis. The input-output technique used in obtaining the control solution for Ontario could not be applied in the same manner to the impact estimates because we know that a disproportionate share of these impacts should be attributed to Ontario. The input-output matrix would fail to take into account the fact that all of the main investment incentives attributable to the tax exemption originate in Ontario, and would under-allocate that province's share.

Identification of the Ontario share of the impact estimates required some partial simulation analysis using selected sub-sectors of the FOCUS model. What was done can be best understood if we recognize that the total economy-wide impact of the tax exemption on any aggregate variable, X , in the FOCUS model can be expressed as

$$\Delta X_T = \Delta X_D + \Delta X_I$$

where

ΔX_T is the total impact, ΔX_D is the "direct impact" before feedback and multiplier effects have occurred, and ΔX_I is the "indirect", or "induced", impact.

If, for example, X is total investment in machinery and equipment, we can think of the total impact as being the sum of any investment stimulated directly by the tax exemption, before feedback and multiplier effects take place, plus any investment induced by the resulting expansion in income and production after the multiplier effects have occurred.⁶ The distinction between direct and indirect effects is particularly relevant, because the direct investment effects of the tax exemption will all occur in Ontario, which is after all the only area in which the exemption applies. On the other hand any indirect investment effects which occur will not be specific to Ontario. The latter will occur (if at all) because new investment in Ontario generates new orders for production machinery from producers located throughout Canada and abroad. Any increase in the domestic production of capital goods which results will *induce* higher incomes and employment throughout Canada. These higher incomes will, in turn, *induce* higher consumption spending and perhaps higher (indirect) investment spending economy-wide.

⁶Perhaps the simplest case of all to understand is what happens to total GNP when government spending, G , is increased. We know from simple textbook illustrations that the total change in GNP will be $\Delta GNP_T = \Delta G \times$ the multiplier of G on GNP. But this can be written as $\Delta GNP_T = \Delta G + \Delta GNP_I$. In other words, the direct effect on GNP is ΔG , the change in government expenditures. The indirect, or induced, effect is the change in GNP from all other sources; e.g., higher consumption, investment, etc.

For investment in machinery and equipment and other variables of interest, the Ontario share of the total impact estimate may be expressed as

$$\text{Ontario impact} = \Delta X_D + \alpha \Delta X_I,$$

where α is the relevant Ontario share coefficient from the input-output analysis. In other words, we can assign to Ontario all of the direct impact of the tax exemption plus the "normal" share of any indirect impact, where the "normal" share is obtained by processing ΔX_I through the input-output or investment shares analyses described earlier.

In order to obtain the direct-indirect split for the variables of interest, a partial simulation of the FOCUS model was performed. In this simulation the assumptions underlying the second solution were used but only the equations determining investment spending, prices, the production function and employment were solved. The feedback and multiplier effects of the model were not permitted to operate. Comparison of the results of this partial solution with those of the control solution enabled us to compute direct impacts. Indirect impacts were then computed residually.⁷

3 The Control Solution

The control solution is summarized for the aggregate economy in Table 1. The values are shown there on an annual basis (in billions of dollars unless otherwise indicated). The FOCUS model is a quarterly model and all values reported in the study, including those for the control solution, were actually generated on a quarterly basis. However, six years of quarterly observations produces some rather gargantuan tables, so it was decided to report all results on an annual basis.⁸

Actual values for 1976 are included in Table 1 in order to give some perspective to the economic environment projected for the next six years. The tone of that environment is one of very gradual recovery from the economic slowdown of the recent past. Real GNP growth is projected to accelerate to 4.8 per cent in 1978, following a 2.1 per cent advance currently anticipated for 1977. Real GNP growth for 1979 through 1982 is projected to average just slightly more than 5.0 per cent per year.

Since Canada's potential GNP is expected to grow at annual rates of 4½-5 per cent over the next several years, the growth rates shown in the control solution tend to exceed potential by only a small margin on the average. As a result of this, the economy-wide unemployment rate is forecast in the control solution to decline only modestly (from 8.2 per cent in 1978 to 6.9 per cent in 1982) over the solution interval. Only a small fraction of the gap which presently exists between the levels of potential and actual GNP is forecast to be eliminated over this period. It is in this sense that the control solution constitutes an overall environment which is relatively poor by historical standards. The past norm has been for the economy to recover relatively quickly from a period of recession or slowdown. Our control solution shows only a very modest and slow-acting recovery in store.

One feature which contributes to the sluggishness of the recovery is a continued high rate of price inflation. The rate of inflation in the CPI is projected to remain in the range

⁷We had no difficulty using this procedure to compute the Ontario impacts for the two components of investment spending, total RDP and total employment. However, it was not possible to allocate the total Ontario RDP impacts to specific industries within the province. The reason for this is, of course, that the sales tax exemption does not apply with equal force to all industries, some benefit more than others. It would be incorrect to assume that the total direct impacts on RDP would be spread proportionately across all industries and, in the absence of detailed industry models, any alternative assumption would produce equally misleading results.

⁸Quarterly values are available upon request.

Control Solution: Economy-Wide Summary

Table 1

	Years						
	1976	1977	1978	1979	1980	1981	1982
Consumer Expenditures	110.54	121.40	132.78	145.54	160.80	179.21	198.07
Government Current Expenditures	38.64	42.80	47.92	52.80	58.00	64.42	71.32
Government Capital Formation	6.52	6.93	7.63	8.55	9.58	10.55	11.61
Business Fixed Capital Formation	37.83	40.39	44.33	50.59	58.50	67.95	76.91
Change in Inventories	2.07	-0.22	1.35	2.17	2.52	2.24	2.39
Exports	45.39	52.65	59.35	65.43	72.61	81.72	90.55
Imports	50.09	57.73	64.28	71.15	79.51	89.56	99.79
GNP	190.03	206.47	231.53	259.53	291.14	327.52	366.39
Annual rate of change (%)	14.9	8.7	12.1	12.1	12.2	12.5	11.9
Real GNP	118.48	121.01	126.78	133.08	140.02	147.95	155.41
PRICES, WAGES, PRODUCTIVITY (% CHANGE)							
GNP Price Index	9.5	6.4	7.0	6.8	6.6	6.5	6.5
Consumer Price Index	7.5	7.9	6.9	6.2	5.9	5.8	5.8
Private Sector Wage Rate	11.3	10.9	9.1	8.3	8.1	8.5	8.3
Output per Man-Year, Private Sector	2.9	0.5	2.5	2.6	3.0	3.5	2.7
Unit Labour Costs, Private Sector	8.8	8.1	6.4	5.6	5.4	5.8	5.7
KEY ECONOMIC INDICATORS							
Housing Starts (000)	275.7	243.7	242.5	249.9	241.6	249.2	259.8
New Passenger Car Sales (000)	936.9	1,061.7	1,132.0	1,193.4	1,264.8	1,342.8	1,419.3
Unemployment Rate (%)	7.2	8.1	8.2	8.0	7.7	7.3	6.9
Personal Savings Rate (%)	10.6	9.6	10.2	10.3	10.1	10.0	9.8
Government Surplus (NI&E) (\$ bil.)	-3.36	-3.86	-5.34	-3.65	-2.14	-1.78	-0.25
Balance of Trade on Goods and Services (\$ bil.)	-4.71	-5.07	-4.93	-5.71	-6.90	-7.84	-9.24
Foreign Exchange Rate (\$Can./\$US)	0.99	1.07	1.08	1.06	1.05	1.07	1.07
INTEREST RATES AND MONEY SUPPLY							
Yield on 90 Day Fin. Co. Paper	9.20	7.49	8.38	7.97	8.31	7.66	7.54
Yield on Industrial Bonds	10.43	11.38	11.50	10.38	10.43	10.04	10.26
Money Supply (M1) (\$ bil.)	18.15	19.67	21.24	22.73	24.09	25.53	27.06
Four-Quarter Rate of Change (%)	7.2	8.4	8.0	7.0	6.0	6.0	6.0
PROFITS AND INCOME (\$ BILLION)							
Corporate Profits before Tax	20.1	21.9	25.2	27.9	31.4	33.7	36.9
Annual Rate of Change (%)	-0.3	9.0	14.9	10.8	12.6	7.2	9.6
Corporate Profits after Tax	12.2	13.9	16.4	18.4	20.8	22.4	24.6
Four-Quarter Rate of Change (%)	-0.6	14.1	17.6	12.3	13.2	7.9	9.6
Personal Disposable Income	126.0	137.2	153.5	171.5	191.1	213.0	237.4
COMPONENTS OF REAL GNP (% CHANGE)							
Consumer Expenditures	6.1	2.6	4.1	5.0	5.7	6.0	5.6
Government Expenditures	-0.2	3.4	4.5	3.5	3.4	2.0	3.3
Residential Construction	17.6	-5.2	-1.0	2.4	1.7	1.5	4.9
Non-Residential Construction	-6.4	-0.3	3.8	9.0	12.3	9.8	6.1
Machinery and Equipment	-0.4	2.5	5.5	9.3	9.5	9.2	6.9
Exports	8.9	8.6	5.2	4.7	4.8	4.3	5.1
Imports	8.2	4.1	4.8	6.2	7.0	3.4	6.0
GNP	4.9	2.1	4.8	5.0	5.2	5.7	5.0

of $6\frac{1}{2}$ -7 per cent per year throughout the time period. A number of factors account for this result, including historically high rates of inflation in food prices and foreign prices (not shown in Table 1). The supposition embodied in the solution is that as long as inflation remains high, federal monetary and fiscal authorities will not undertake to provide strong stimulus to the growth in real output and employment.

The policy environment depicted is stringent in comparison with the past. It is assumed that monetary authorities will continue to keep a close reign on the monetary aggregates. The rate of growth in the narrowly-defined money supply (M1) is projected to be reduced from its present rate of 8.4 per cent per year to 6.0 per cent per year by the end of the solution interval. This is one important policy factor restricting the growth of domestic demand. Fiscal policy is another. The rate of growth in real government purchases of goods and services is substantially below that of real GNP in every year and exceeds 3.5 per cent only in 1978. At the same time, taxation policy is sufficiently restrictive to produce a budget position which reduces a \$3.86 billion deficit in 1977 (for all levels of government combined) to a \$0.25 billion deficit by 1982.⁹

That overall GNP growth is as high as it is in the control solution is due primarily to a strong export performance in the first half of the period and a strong rate of expansion in business investment over the 1979-1981 interval. The former represents the effects of continued economic recovery by the United States and our overseas trading partners over the near-term future. The latter reflects primarily the impacts of large anticipated investments in the James Bay and ALCAN pipeline projects.

We know from present spending plans that the Canadian portion of spending on James Bay and ALCAN together will total something in the neighbourhood of \$2 $\frac{1}{4}$ billion in 1978, \$3 billion in 1979, \$4 billion in 1980 and at least \$1 $\frac{1}{2}$ -\$2 billion in each of 1981 and 1982. Much of this will show up as new investment in machinery and equipment and new non-residential construction. The control solution projections for these variables reflect an attempt to incorporate these large investment projects.

The Balance of Trade figures in Table 1 are also highly affected by these investment projects. Many of the materials used in James Bay and ALCAN will be imported. Canada's balance of payments on goods and services will show large deficits over coming years. However, these deficits will be matched by an inflow of foreign money capital (not shown in Table 1), as the investment projects will be forced to borrow large sums in foreign capital markets. Thus the large deficits shown in the control solution do not imply an over-valued Canadian dollar and the foreign exchange rate is projected to remain reasonably stable over the time period.

Turning our attention towards Ontario, the main implications of the control solution are summarized in Table 2. The number of variables appearing in this table is sparse because provincial data relating to the National Income and Expenditure Accounts variables employed by the FOCUS model is practically non-existent. (This is true for all provinces, not just Ontario.) Appearing in the table are projections for business investment in machinery and equipment and business non-residential construction expenditures in both current and constant (1971) prices, total provincial Gross Domestic Product in constant (1971) prices and total employment. Of these variables only employment is a readily available data series with published history. We had to construct the other four variables even to the extent of generating the historical values shown for 1976.

⁹The identical policy assumptions are maintained through all the alternative solutions generated in the study. The size of the surplus or deficit does, of course, vary from solution to solution because of movements in income. But tax rates and money supply growth are held constant.

Control Solution: Ontario Summary

Table 2

	1976	1977	1978	1979	1980	1981	1982
Business Expenditures on New Machinery and Equipment (\$ million)	5,067	5,389	6,077	7,068	8,234	9,746	11,077
(% Change)	2.73	6.35	12.77	16.31	16.50	18.36	13.66
Business Expenditures on New Non-Residential Construction (\$ million)	3,350	3,201	3,551	4,178	5,101	6,115	7,014
(% Change)	-0.24	-4.44	10.93	17.66	22.09	19.88	14.70
Real Business Expenditures on New Machinery and Equipment (1971 \$ million)	3,429	3,425	3,612	3,948	4,322	4,721	5,048
(% Change)	-3.68	-0.11	5.46	9.30	9.47	9.23	6.93
Real Business Expenditures on New Non-Residential Construction (1971 \$ million)	2,049	1,808	1,877	2,046	2,299	2,523	2,678
(% Change)	-8.85	-10.00	3.82	9.00	12.36	9.74	6.14
Real Provincial Gross Domestic Product (1971 \$ million)	41,202	41,906	43,814	46,001	48,390	51,190	53,773
(% Change)	5.51	1.71	4.55	4.99	5.19	5.79	5.05
Total Employment (000)	3,689	3,739	3,834	3,934	4,035	4,135	4,240
(% Change)	2.10	1.36	2.54	2.61	2.57	2.48	2.54

Of prime interest in this study are the investment projections. The figures shown are compatible with NI&E Accounts concepts of investment. For 1976 and 1977 they do not match exactly with published figures for Ontario from *Private and Public Investment in Canada*, though the discrepancies are small.¹⁰ In obtaining the projections for 1978-1982, we have assumed that the same constant share of total economy investment will occur in Ontario as is projected for 1977.¹¹ Given the strong growth projected economy-wide, the investment projections for Ontario show strong growth relative to overall growth in provincial Real Domestic Product.

It should be noted that these figures "assume" that Ontario investment will receive substantial boosts from the James Bay and ALCAN projects. To some extent this is a valid assumption: there is little doubt that Ontario industry will be asked to supply many material inputs to these projects. However, Ontario's "share" of these materials may be somewhat lower than its average share of other investments, and therefore there exists

¹⁰Capital expenditures reported in *Public and Private Investment in Canada* differ from those reported in the *National Income and Expenditure Accounts* in that the former include defence construction, net sales of used motor vehicles and scrap and salvage values, whereas the latter make allowances for the transfer costs of land and existing buildings. The Ontario investment figures in Table 2 are on the NI&E Accounts basis.

¹¹Ontario's share of total private investment in machinery and equipment has been declining in recent years—having dropped from 38.5 per cent of the total in 1975 to 37.3 per cent in 1976 and 36.3 per cent in mid-year estimates for 1977. This decline coincides with two major developments in the Canadian economy:

- (1) a rapid rise in capital-intensive, energy-related investments in other parts of Canada since the energy price acceleration of 1974; and,
- (2) a sharp drop in Canadian exports of processed and semi-processed goods as a result of the deep recession in the rest of the world over much of this period.

Both of these developments have contributed to the declining Ontario share of investment; the former by raising investment in the rest of Canada and the latter by discouraging new investment in Ontario's export-based manufacturing sector.

As we look ahead to the future the first effect is likely to continue to operate over the near term. However, the second effect is not likely to continue and should even reverse itself as the rest of the world continues to recover from its recession and as Canada's recent exchange rate depreciation begins to make itself felt in foreign markets. It is difficult to predict what Ontario's share of total investment might be as a result of this, but we do not feel it will continue to decline appreciably. We have, therefore, projected the share to remain constant at the 0.363 per cent (1977) value over the simulation horizon.

a definite risk that our investment projections may be too high. This is a risk we cannot avoid in the absence of detailed information as to the specific suppliers of James Bay and ALCAN materials. But we can test the sensitivity of our overall simulation results to variations in projected levels of Ontario investment in the control solution. We do perform such a test and report on the findings later in the study (Section 5).

Turning to the Real Domestic Product (RDP) figures, it can be seen from Table 2 that Ontario is projected to share in the moderate recovery forecast for the overall economy over the solution interval. Ontario's RDP expands at a slightly slower rate than total GNP in 1978, but "catches up" in the remaining years. Ontario employment levels are projected to grow at rates commensurate with RDP growth, adjusted for increasing productivity.

The industrial distribution of Ontario's RDP is shown in detail in Table 3. It must be stressed that many of the series projected in Table 3 have no "history": provincial breakdowns of census value added are published only for several large aggregations of goods-producing industries.¹²

Control Solution: Ontario Real Domestic Product by Industry
(millions of 1971 dollars)

Table 3

	1976	1977	1978	1979	1980	1981	1982
Agriculture, Fishing and Trapping	905	922	971	1,019	1,067	1,117	1,169
Forestry	106	109	114	118	123	129	134
Mineral Fuel Mines and Wells	0	0	0	0	0	0	0
Other Mines and Quarries	755	787	826	864	903	946	988
Food, Feed, Beverages and Tobacco	1,498	1,488	1,547	1,607	1,665	1,720	1,780
Textile and Clothing	628	621	650	683	717	754	787
Wood and Furniture	396	399	415	435	457	485	506
Paper and Allied Industries	1,216	1,237	1,290	1,343	1,398	1,458	1,516
Primary Metal and Metal							
Fabricating	2,347	2,373	2,476	2,605	2,744	2,899	3,034
Motor Vehicles and Parts	1,957	2,069	2,212	2,358	2,511	2,699	2,871
Machinery and Other							
Transportation Equipment	1,118	1,152	1,217	1,295	1,375	1,469	1,550
Electrical Products	1,184	1,189	1,240	1,308	1,383	1,474	1,543
Chemical, Rubber and Petroleum							
Products	1,616	1,658	1,763	1,874	1,992	2,124	2,252
Non-Metallic Mineral Products	472	468	488	515	546	579	607
Other Manufacturing Industries	630	629	657	689	723	762	795
Construction	2,476	2,411	2,486	2,628	2,795	2,965	3,111
Electric Power and Gas Utilities	1,009	1,028	1,091	1,157	1,225	1,297	1,371
Total: Commercial Goods Industries	18,316	18,541	19,444	20,499	21,624	22,875	24,017
Transportation and Storage	1,856	1,904	2,000	2,103	2,213	2,340	2,460
Communication	1,219	1,256	1,325	1,405	1,493	1,601	1,704
Trade	5,453	5,466	5,758	6,090	6,450	6,875	7,241
Finance, Insurance and Real Estate	5,832	5,975	6,209	6,493	6,828	7,272	7,687
Other Service Industries	4,292	4,417	4,623	4,853	5,117	5,453	5,777
Total: Commercial Service Industries	18,651	19,017	19,914	20,943	22,101	23,541	24,870
Personal Sector	0	0	0	0	0	0	0
Government Sector	4,236	4,348	4,456	4,559	4,665	4,774	4,886
Total: All Industries ¹	41,202	41,906	43,814	46,001	48,390	51,190	53,773

¹Does not add due to rounding.

¹²There is also a long data preparation and publication lag. Preliminary 1975 figures for such industries as are available were released only in October, 1977.

4 Simulation Results

Estimated net impacts of the production machinery exemption on economic activity in Ontario and all of Canada are reported in Tables 4 through 8. Discussion of these simulation results is made easier if we first present a brief analysis of what kind of results we might expect to find on the basis of theoretical considerations.

Exemption from the retail sales tax has the effect of reducing the price of production machinery to firms affected by the measure. Economic theory indicates the following responses:

1. the affected firms will attempt to substitute production machinery for production labour (i.e., demand more machinery and less labour);
2. these same firms will attempt to increase production facilities and production levels;
3. new firms will be drawn into the affected industries and production will expand for this reason as well; and,
4. higher production levels will force the output prices of affected industries downwards.

These responses constitute what we have called the “direct” impacts of the exemption in earlier sections of this report. We are now in a position to predict the direction of the direct impacts on Ontario variables of interest. Responses (1), (2) and (3) will all contribute to an increased level of *real* investment in machinery and equipment. This effect will be greater, the more readily Ontario producers are able to substitute machinery for labour via response (1). *Nominal* expenditures on machinery and equipment may rise or fall, depending upon the size of the response in real investment. Remember that the tax exemption reduces the price of machinery. Total nominal expenditures will decline unless the increase in real spending is sufficiently large to overwhelm the tax effect.

The direct impacts on real investment in non-residential construction will be positive via responses (2) and (3). This effect will also be greater, the greater the substitution between machinery and labour. The reason for this is that total production costs will be lowered by the tax exemption, and cost reductions will be greatest in industries which are able to effectively substitute lower priced machinery for production labour. Thus the industries with the greatest substitution possibilities will receive the greatest increments to after-tax profits. Since high profits attract new firms, plant facilities will expand more in these industries. *Nominal* investment in new non-residential construction should also increase because the tax exemption does not apply to construction materials or equipment so there is no tax-induced reduction in the prices of these goods.

The direct impacts on Ontario RDP should mirror those in real non-residential construction because the same incentives apply to both variables.

The direct impacts on Ontario employment are ambiguous. Response (1) will lead to a reduction in employment, which will obviously be greater, the greater are the substitution possibilities. Responses (2) and (3) will lead to increases in employment inasmuch as expansion in output and plant facilities will require additional workers.

It is clear from the preceding that substitution possibilities embedded in the equations of the FOCUS model will play a large part in determining the simulated direct impact results. It happens that equations of the model show production machinery and production labour to be relatively close substitutes. In the jargon of economic theory, the elasticity of substitution between these two factors is 1.0 within the model. This value is probably higher than that employed by some other econometric models but it is entirely compatible

with a large part of the theoretical literature dealing with the substitution question. The relevant equations of the FOCUS model have been carefully specified to ensure that the capital-labour nexus has been modeled in a theoretically and internally consistent manner. This, plus the fact that the history of the Canadian economy is compatible with an elasticity of substitution equal to 1.0, makes us confident that the model will produce reasonable estimates for the direct impacts.¹³

To complete the story of the anticipated direction of the effects we turn to the indirect impacts. The indirect impacts represent multiplier effects stimulated by the direct expansion of income created by the tax reduction. We would expect, therefore, that the indirect impacts will be expansionary on both categories of investment, RDP and employment. Let us now examine the actual findings.

Ontario Aggregates

Table 4 reports the estimated impacts on nominal levels of investment spending in Ontario. Direct, indirect and total impacts are shown separately. For investment in machinery and equipment the direct impacts are negative in the first four years of the simulation and positive in the last two. The second row of figures in the table shows how much of this direct impact is due to the reduction in sales taxes on production machinery. The third row of figures nets out these tax effects and reveals that the direct impact does indeed embody some expansion in the physical stock of machinery, though this is shown more clearly in the following tables. The indirect impacts on machinery investment are shown to be positive throughout the time period.

The lower part of Table 4 applies to nominal investment in non-residential construction. It will be observed that the direct impacts here are positive and small in the first year, rise to a peak in 1980, then drop slightly in 1981 and 1982. This time pattern shows up because the construction of new plant reacts to more favourable investment incentives with a relatively long lag. Surprisingly, the indirect effects for this variable are negative in all

**Net Impacts of the Production Machinery Exemption
on Nominal Levels of Business Investment in Ontario**
(\$ million)

Table 4

		1977	1978	1979	1980	1981	1982
Business Expenditures on New Machinery and Equipment	Direct Impact	-106.3	-70.2	-56.8	-20.9	11.8	11.7
	Less: Change in Sales Taxes (-156.5)	(-177.9)	(-206.9)	(-241.0)	(-285.2)	(-324.2)	
	Direct Impact, Net of Sales Taxes	50.2	107.7	150.1	220.1	297.0	335.9
	Indirect Impact	5.0	23.2	21.2	12.6	7.4	18.8
	Total Impact, Net of Sales Taxes	55.2	131.0	171.4	232.7	304.5	354.8
	Total Impact as % of Control Solution	1.05	2.16	2.42	2.83	3.12	3.20
Business Expenditures on New Non- Residential Construction	Direct Impact	9.4	41.9	72.6	79.9	79.5	72.8
	Indirect Impact	-8.0	-16.9	-13.9	-2.3	0.2	-4.6
	Total Impact	1.4	25.0	58.7	77.6	79.7	68.2
	Total Impact as % of Control Solution	0.04	0.70	1.40	1.52	1.30	0.97

¹³For reasons of curiosity, we have replicated the simulation experiments of this study with the elasticity of substitution constrained to equal zero within the FOCUS model. The effects of this on the direct impacts of the tax exemption run in the directions indicated in the preceding discussion. Those results are available upon request.

but one year. We might have predicted this outcome in advance had we dug a little deeper into the earlier theoretical analysis. What has happened here is that a direct expansion in production has forced a competitive reduction in output prices. Firms not subject to the tax exemption have seen some reduction in sales revenues with no reduction in costs. Hence these firms contract slightly, producing small negative indirect effects.

Total net impacts on non-residential construction are dominated by the larger direct impacts. We can use the figures from Table 4 to make sure there is no confusion as to interpretation of any of the figures in any of the tables. For 1977 the total net impact on construction is shown to be \$1.4 million. This means that the nominal value of construction in Ontario is estimated to be \$1.4 million higher in 1977 than it would have been if the sales tax exemption had not been granted. That amounts to 0.04 per cent of the 1977 control solution value for total nominal construction in Ontario.

The difficulties of working with nominal dollar figures are avoided in Table 5, which summarizes the Ontario impacts in constant (1971) dollar magnitudes. From the first part of this table it can be seen that the impacts on the real demand for new machinery are uniformly and unambiguously positive. The RDP impacts are also uniformly positive for the total and both sub-component impacts. The employment impacts are mixed. The direct impacts are negative for the first four years and positive for the last two. These results show that the substitution of machinery for labour is an effect which dominates the early years of the simulation. The peak substitution occurs in 1978 when the direct impact on employment measures a decline of over 15.7 thousand workers. As time passes in the simulation, more and more new plant is put into place and a growing number of overhead jobs is created. The new overhead employment begins to exceed the loss of

Net Impacts of the Production Machinery Exemption
on Real Economic Activity in Ontario

Table 5

		1977	1978	1979	1980	1981	1982
		1971 \$ million					
Real Business Expenditures on New Machinery and Equipment	Direct Impact	27.3	58.3	77.4	108.3	135.9	144.6
	Indirect Impact	7.1	19.3	16.2	9.5	6.0	12.5
	Total Impact	34.4	77.6	93.6	117.5	141.9	157.1
	Total Impact as % of Control Solution	1.00	2.15	2.37	2.72	3.01	3.11
Real Business Expenditures on New Non- Residential Construction	Direct Impact	5.1	22.1	35.5	36.1	33.0	27.9
	Indirect Impact	-1.2	-4.2	-3.1	1.3	2.4	1.9
	Total Impact	3.9	17.9	32.4	37.4	35.4	29.8
	Total Impact as % of Control Solution	0.22	0.95	1.58	1.63	1.40	1.11
Real Provincial Gross Domestic Product	Direct Impact	39.2	42.6	85.8	145.4	193.6	215.3
	Indirect Impact	88.2	151.8	150.2	109.9	70.2	78.9
	Total Impact	127.4	194.4	236.0	255.3	263.8	294.2
	Total Impact as % of Control Solution	0.30	0.44	0.51	0.53	0.52	0.55
		persons					
Employment	Direct Impact	-7,510	-15,732	-11,047	-1,200	5,610	4,493
	Indirect Impact	3,740	9,654	11,461	9,809	6,254	4,539
	Total Impact	-3,770	-6,078	414	8,609	11,864	9,032
	Total Impact as % of Control Solution	-0.10	-0.16	0.01	0.21	0.29	0.21

employment due to substitution effects by late 1980, and the direct employment impacts are positive thereafter.

The indirect employment effects are positive throughout the interval as theoretical considerations led us to expect they would be. The total net impacts are computed as the sum of direct and indirect components. We find the total employment impact to be negative in 1977 and 1978 and positive thereafter, but the effects are never large relative to the overall level of employment in Ontario. Nor are they large in relation to the net impacts on RDP and the two investment variables. In fact, the results show labour's productivity to have been enhanced by the tax exemption. The percentage change in productivity attributable to the exemption may be computed for any year as the difference between the percentage impacts on RDP and the percentage impacts on employment. For 1977 the value is +0.40 per cent; for 1978 it is +0.60 per cent; and so on to 1982 when the effect on productivity is +0.34 per cent.

These figures are not terribly large, but we remind the reader that they apply to labour's productivity for the whole of Ontario. Since this effect is the result of making production more capital intensive (and less labour intensive) in those industries which benefit from the production machinery exemption, we should expect to find that labour's productivity in these industries has risen by $2\frac{1}{2}$ to 3 times the amount shown for the entire province. At a time when Canada's productivity relative to that of our international trading partners is an issue of some concern, this is a welcome finding. All the more so considering that Ontario's manufacturing industry is both a key issue in this concern and a major beneficiary of the Provincial tax exemption. The tax exemption to some extent desensitizes the international competitive position of Ontario industry to labour market performance.¹⁴

We recognize that the constant (1971) price base used to measure real economic effects in Table 5 may be somewhat confusing to readers unfamiliar with NI&E practices in this regard. In order to present the findings in a mode more comfortable to this segment of the audience, the main results in Table 5 are summarized again in Table 6 using constant 1977 prices. Figures in the first row of this table show the estimated value of the production machinery exemption valued in 1977 prices. Figures in the second row show the total net impact on machinery and non-residential investment in Ontario, also valued in 1977 prices, and so on.

**Net Impacts of the Production Machinery Exemption on
Economic Activity in Ontario Valued at Constant 1977 Prices**

Table 6

(millions of 1977 dollars)

	1977	1978	1979	1980	1981	1982
(1) Estimated Value of the Sales Tax Exemption in 1977 Prices	156.5	166.0	181.5	199.1	222.2	238.1
(2) Total Net Impact on Business Investment in Ontario in 1977 Prices	-99.8	-20.0	21.3	58.3	72.5	66.8
(3) Total Net Impact on Business Investment in Ontario, Net of Sales Tax (= (2) + (1))	56.6	146.0	202.8	257.4	294.6	304.9
(4) Total Net Impact on Domestic Product in Ontario in 1977 Prices	210.9	321.9	390.7	422.7	436.8	487.1
(5) Implied Real Multiplier (= (4) ÷ (1))	1.35	1.94	2.15	2.12	1.97	2.05

¹⁴Because wage rates are little affected by the tax exemption, the higher productivity induced by it means that unit labour costs will decline in roughly the same proportion that productivity rises.

Of particular interest in Table 6 are the figures in row 5, which show the implied real multiplier of the tax exemption on provincial RDP. The first value in this row is 1.35, which should be interpreted as meaning that provincial RDP increases by \$1.35 for every \$1 in production machinery taxes given up in the same year by the Ontario Government. The value of this multiplier rises over time, reaching a peak value of 2.15 in 1979.

One way of comparing the impacts of alternative policies is to compare the size of their multipliers. On this basis the multipliers reported in Table 6 are very large. The multipliers associated with, say an across-the-board reduction in Provincial income taxes, would be nowhere near this size. The figures in Table 6 are, in fact, so large that we cannot conceive of an alternative tax policy which would produce comparable results. If the Ontario Government's objective was to get the maximum impact on provincial output per dollar of revenue loss, then it appears that they have chosen the right course of action.¹⁵

Economy-Wide Impacts

Impacts of the Ontario tax exemption on the aggregate economy are summarized in Table 7. On the RDP ledger, figures in the table show that, while other regions of Canada do experience positive impacts, a substantial share of the effects are retained in Ontario. Only in 1977 and 1978 are the Ontario/Rest-of-Canada impacts on RDP of comparable magnitudes. Beyond that the Ontario impacts tend to dominate. These results are reversed with regard to employment. Positive net impacts on employment in the rest of Canada occur throughout the period. The figures are smaller than the comparable values for Ontario only in 1981 and 1982.

It is important to note that the results of the simulations do not include any allowance for the possible in-migration of producers to Ontario from other regions of Canada. The FOCUS model used in the simulations is an aggregate model and cannot capture such effects. It is clear from our direct impact estimates that the tax exemption will enhance the economic climate in Ontario and make it a more attractive area for investment. It can logically be expected that some relocation of industry will be induced. How large this might be, we cannot say. Methods other than simulations with an econometric model might be used to estimate it. We can do little here except note that any relocation which does occur will alter the distribution of RDP and employment impacts in Ontario's favour. The greater the relocation, the greater will be the redistribution of these impacts towards Ontario. It may well be that enough relocation will occur to cancel the negative employment impacts shown for Ontario in 1977 and 1978 in our simulations.

The remaining economy-wide figures in Table 7 apply to prices and the balance of international payments on goods and services. Of these, the price impacts are the most intuitively plausible. The net impacts on prices are unambiguously negative throughout the time period. This result makes sense. The tax reduction will of itself cause a reduction in the price index for total GNP, of which production machinery prices are one component. This decline is reinforced by an expansion of production facilities in Ontario which forces other prices, including the CPI, downward.

The balance of payments impacts are a response to both the price level and RDP movements. Exports in the FOCUS model increase as prices fall. Imports decline with falling prices and increase with rising income. In the early years of the simulation the price effects dominate and the balance on goods and services improves. Over time the price movements moderate while the RDP impact increases. As a result the net impact estimates

¹⁵This applies only to maximizing the output effects. Different policies might have larger effects on employment or some other policy objective.

Estimated Net Impacts of the Production Machinery Exemption
on Selected Economy-Wide Variables

Table 7

	1977	1978	1979	1980	1981	1982
	1971 \$ million					
Real Gross Domestic Product	Ontario	127.4	194.4	236.0	255.3	263.8
	Rest of Canada	121.8	204.4	195.3	140.8	89.6
	Canada, Total	249.2	398.8	431.3	396.1	353.4
	Total as % of Control Solution	0.27	0.41	0.42	0.37	0.31
	persons					
Employment	Ontario	-3,770	-6,078	414	8,609	11,864
	Rest of Canada	5,275	12,635	13,484	9,861	4,980
	Canada, Total	1,505	6,557	13,898	18,470	16,844
	Total as % of Control Solution	0.02	0.07	0.14	0.18	0.16
	1971 \$ million					
Real GNP	197.0	356.5	379.7	326.2	269.3	315.5
Real GNP as % of Control Solution	0.16	0.28	0.29	0.23	0.18	0.20
	percentages					
GNP Price Index as % of Control Solution	-0.27	-0.36	-0.26	-0.14	-0.12	-0.19
CPI as % of Control Solution	-0.13	-0.16	-0.11	-0.07	-0.06	-0.10
	\$ million					
Balance of Payments on Goods and Services	87.3	65.6	42.6	-86.9	-221.9	-266.8

show the balance on goods and services deteriorating, becoming negative in 1980, and continuing to decline through 1982. The final-year impact is not large relative to the level of the deficit shown in the control solution.

5 Concluding Comments

The findings of this study are that the production machinery exemption will benefit Ontario producers by lowering the prices they pay for production machinery and encouraging the substitution of new machinery for production labour. Simulation results for 1977 imply that the exemption has stimulated net positive increases in the levels of real production and investment in Ontario since its introduction at the beginning of that year. Results for 1978-1982 imply that these net increments will continue to accumulate over the medium-term future. The Ontario employment results show small negative impacts deriving from the exemption for 1977 through 1978 and small positive impacts thereafter.

These findings are subject to all of the limitations ordinarily associated with forward-looking simulation analysis. Specifically, the quantitative impact estimates are specific to the model which generated them and sensitive to the economic environment depicted in the control solution.

A different econometric model would yield different estimates, even if all of the assumptions made in this study could be replicated exactly. Those differences would reflect differences in the model builders' views of how the true economy functions. Since such views represent different interpretations of fundamental economic theory, we cannot

say *a priori* that any one model is to be preferred to any other. Perhaps the best defense we can make for the choice of the FOCUS model is that it was designed specifically to be useful for considering the kinds of policy questions addressed in this study.

Sensitivity of the simulation results to the control solution is a limitation noted at several instances in earlier sections. We were especially concerned that the rather bullish investment projections in the control solution for Ontario might be overly optimistic. If so, the impact estimates are likely to overstate the net impacts of the tax exemption. To test the sensitivity of the results to this element, we re-ran most of the simulation experiments based on an alternative control solution. In the alternative, real investment spending in Ontario was projected to grow at rates 5 percentage points lower than those shown in Table 2 for 1978-1982. This amounts to a sharp downward revision in the levels of real investment in both machinery and equipment and non-residential construction. The levels of these variables were reduced relative to the original control solution by 5 per cent in 1978, 10 per cent in 1979, 15 per cent in 1980, 20 per cent in 1981 and 25 per cent in 1982. The direct reduction in sales taxes implied by the exemption is reduced in manner proportionate to these figures when the alternative control solution is used in the simulation experiments.

Not surprisingly, the estimated overall net impacts of the tax exemption declined for all but one variable over the 1978-1982 interval in the alternative simulations. The exception was the employment impact, which rose because of a smaller negative substitution factor. Overall, this exercise produced a slightly scaled-down version of our original results. The multipliers of real taxes on real provincial RDP were virtually identical with those shown in Section 4, Table 6. There was nothing in the new results which would lead us to alter our earlier conclusions regarding the efficiency of the tax exemption as a means of stimulating provincial RDP and investment.

Another limitation of the study which was touched on earlier is the fact that the analysis has made no allowance for possible in-migration of firms to Ontario from the rest of Canada. The tax exemption does provide incentives which would encourage that result. Insofar as some of this can be expected to occur, the reported results will understate the net impacts of the exemption on all Ontario variables.

The reader should be aware that our analysis has dealt only with easily quantifiable effects. Impacts of the tax exemption on such intangibles as investors' confidence and the investment climate in Ontario have been ignored. Investment decisions depend every bit as much upon investors' expectations of future market and policy developments as they do upon current price and profit conditions. In this sense the intangibles are important elements of the decision process. It seems clear that if the tax exemption has had any impact upon these intangible factors, it has been in the positive direction.

Having listed the major limitations of the study it would be fitting to conclude on a positive note. Perhaps the most significant finding of the study has to do with the size of the estimated multipliers of the tax exemption on provincial RDP. These multipliers were found to be in the range of 1.35 to 2.15 over the six-year simulation interval. It is worth repeating the statement made in the preceding section that it would be difficult to think of any other policy which, if taken at the Provincial level, would stimulate production levels to as great an extent.

Appendix A: The Models

A1 THE FOCUS MODEL

The FOCUS model is an intermediate size macro-econometric model of the Canadian economy consisting of some 250 behavioural equations and identities.¹ It was developed at the Institute for Policy Analysis, the University of Toronto, for use in economic forecasting and policy simulation under the auspices of the Policy and Economic Analysis Program. The model is available on an interactive time-sharing basis to members of the "PEAP" program.

FOCUS is a new model having been completed in the fall of 1977. It is the descendant of the IPA's old Quarterly Econometric Forecasting Model, which was actively used for forecasting and policy simulation from 1971-1976. FOCUS goes far beyond a simple update of the old Quarterly model; it is a second generation model with considerably improved specification and detail. The differences were so great that the new model warranted a new name: FOCUS, an acronym for *forecasting and user simulation model*.

The theoretical viewpoint depicted in FOCUS is distinctly "Keynesian" in orientation. (However, specification is sufficiently flexible that the model is capable of being converted to a "Monetarist" model with relatively few changes in parameters.) The model determines economy-wide incomes and output through the interaction of financial and real economic variables in a manner not dissimilar to the textbook explanation of the intersection of IS and LM schedules. The aggregate demand for goods and services is the chief determining factor in this process. Demand is disaggregated to the extent permitted by the Quarterly National Income and Expenditure Accounts.

Factor demand equations determining employment and investment expenditures characterize the supply side of the model. These equations are derived directly from economic theory and are interrelated. They show production labour and production machinery to be substitute factors of production. The capital labour ratio for these two factors is responsive to changes in their relative prices. Both factors are complementary to capital investment in new non-residential structures.

Money wage rates are determined through an extended Phillips curve, which shifts with changes in expected rates of price inflation and U.S. wage rates. Wage costs, machinery costs, import costs and *ad valorem* indirect business taxes are combined to form a short-run aggregate supply schedule within the model. The overall price level equates aggregate supply with aggregate demand.

The model's equations were specified with careful attention to policy factors. All of the major taxes and transfer payment programs are included, and the model is sensitive to variations in a wide variety of policy parameters. Monetary policy exerts an influence on the overall behaviour of the model as does mortgage market activity of the CMHC.

A2 METHOD OF CALCULATING ONTARIO OUTPUT AND EMPLOYMENT

The model of National and Ontario Output and Employment developed by the Institute for Policy Analysis is described in detail in Foot, *et al.*,² and, in its present form,

¹Detailed descriptions of these equations are contained in, *FOCUS, Forecasting and User Simulation Model*, available from the Institute for Policy Analysis, University of Toronto.

²Foot, D. K., J. E. Pesando, J. A. Sawyer and J. W. L. Winder (1977), *The Ontario Economy 1977-1987*, Report submitted to the Ontario Economic Council, April, 1977.

in Sawyer, *et al.*³ We present in this Appendix only a non-technical summary of the model, highlighting its principle features.

A2.1 The Procedure

From the FOCUS model of the Canadian economy we obtain projections for nine categories of real final expenditure. These are:

1. Consumption of Durables
2. Consumption of Semi-Durables
3. Consumption of Non-Durables
4. Consumption of Services
5. Private Investment in Structures (Residential and Non-Residential)
6. Private Investment in Machinery and Equipment
7. Government Fixed Capital Formation
8. Total Exports (less Capital Service Receipts)
9. Government Current Expenditures

The FOCUS expenditure projections are passed through an input-output “Impact” matrix⁴ which computes the Real Domestic Product (RDP) required of each industry in order to supply the given expenditure.

The Impact matrix is constructed such that both direct and *indirect* demand are accounted for. For example, RDP requires that the matrix calculate for a given level of consumer durable expenditure not only the product of sectors supplying consumer durables directly but also the product of sectors supplying intermediate goods to consumer-durables manufacturers.

The matrix calculation gives only a first approximation to RDP by industry at the national level. We adjust this approximation in two ways: First, there are definitional differences between the input-output system of industrial classification and that used in the system of National Accounts. A multiplicative adjustment is applied to each sector over every year of the projection to correct for this discrepancy, with the correction factors obtained by passing actual 1971 expenditures through the matrix and comparing results with 1971 National Accounts’ RDP detail. A second adjustment, which accumulates at a compound rate after 1971, attempts to capture technological and relative-price shifts, both of which the static input-output analysis must assume away. The shift factors were obtained by comparison of matrix results and actual RDP’s for 1971 through 1976.

As a final step, when necessary, the RDP’s by sector are adjusted proportionally to sum to the total of private RDP as projected by FOCUS.

Employment by industry at the national level is obtained from the RDP estimates in two steps. First, total man-hours in each sector are calculated using the 1971 ratio of hours to RDP and, for succeeding years, an additional compounded adjustment for productivity changes. The assumption is made that productivity will increase in the future at about the average over 1969-1976. Second, man-hours are converted to measures of sectoral employment using 1971 hours per week as a base and an additional compounded adjustment for *changes* in hours worked, again assuming that the average change over 1969-1976 will continue.

³Sawyer, J. A., J. W. L. Winder and D. P. Dungan (1978), *The Ontario Economy 1978-87*, Report to be submitted to the Ontario Economic Council, January, 1978.

⁴Prepared by Statistics Canada from the 1971 Input-Output Tables.

As with the RDP's, sectoral employment, when necessary, is adjusted proportionally to sum to the total private employment projected by FOCUS.⁵

Lastly, Ontario RDP and employment by sector are computed by applying fixed Ontario-share coefficients to the national estimates. The source of these coefficients varies across sectors: For the few industries for which provincial census value added is reported, we use the average of the Ontario fraction, 1969 through 1975. For manufacturing industries, Ontario shares are calculated from Census of Manufacturers data, 1969 through 1974. For several service industries we had to make do with Ontario shares of total employment as reported in the Labour Force Survey, with the shares 1969 through 1976 being averaged.

Little or no reliable trend was found in the Ontario shares over the period examined; thus they remain fixed through the projection period.

Finally, it should be observed that the entire Industry-Ontario model is post-recursive with respect to FOCUS. That is, none of its results feed back into the FOCUS model to evoke secondary adjustments in the national solution.

A2.2 Limitations of the Procedure

Obviously, the procedure described above is rather unsophisticated. We have found, however, that in devising a method of estimating industrial and provincial detail, there is virtually no middle ground between a rather simple procedure, such as we have adopted, and quite complex procedures—such as those embodied in the CANDIDE model and its regional variant. We have chosen the former due primarily to resource constraints but also because the simpler procedure is more readily manipulated, comprehended and adapted to specific tasks or projects.

If the most important drawback of our approach had to be named, we would submit that it is the failure to coordinate systematically our different sectoral productivity projections with the structure of relative prices in FOCUS determining the composition of final expenditure.⁶ In the extreme, this leads to the anomalous result that if we lower our estimate of productivity growth in a certain sector, and make no other changes, we will simply cause the employment projection for this sector to *increase*—and nothing more.

At the same time, it should be stressed that we have no reason to believe that the relative price projections in FOCUS, and their impact on demand, are actually *antithetical* to our sectoral productivity projections. We have simply had neither the time nor the resources to examine the matter closely, nor to link the two elements in alternative-scenario simulations.

A2.3 Goodness of Fit

With a procedure of this relative simplicity, and in view of the data-reconciliation problems to be encountered, we judged unwarranted an effort to tune our model with great precision to the historical record. Indeed, there are considerable gaps and deficiencies in the record itself—especially with respect to provincial RDP's.

Nonetheless, we have considerable confidence in the overall accuracy of our approach. Our national industrial RDP estimates for 1971-1976 (*prior* to adjustment for total RDP)

⁵Employment and RDP of government are taken directly from the FOCUS model.

⁶We might have objections with the manner in which this is handled in CANDIDE; but at least the attempt is made.

vary from history by over 6 per cent in only 17 of the 126 relevant observations,⁷ and by over 10 per cent for only four observations. Most of the errors are for the smaller and more erratic sectors. The Ontario employment totals our model generates over the same period have an average error of only 13,000 (out of a total of over 3 million). Still, we would urge the interested user to place more attention on the *changes* the model generates (both year-to-year and over alternative scenarios) than on pure levels estimates.

Appendix B

Estimated Tax Effects by Industry for 1977 Ontario Investment Intentions

Industry	Intended Expenditures on New Machinery ¹	Portion Eligible for Exemption ²	Tax Cost of Exemption at 7%
	(\$ million)	(%)	(\$ million)
Agriculture, Fishing and Trapping	489.6	0	0.0
Forestry	19.1	95	1.3
Mineral Fuel Mines and Wells	—	—	—
Other Mines and Quarries	122.8	95	8.2
Food, Feed, Beverages and Tobacco	168.9	75.8	10.4 ³
Textile and Clothing	41.7	80	2.8
Wood and Furniture	33.3	79	2.2
Paper and Allied Industries	271.4	87	19.2 ³
Primary Metal and Metal Fabricating	520.6	80	33.7 ³
Motor Vehicles and Parts	191.3 ⁴	90	14.2 ³
Machinery and Other Transportation Equipment	112.4 ⁴	90	8.0 ³
Electrical Products	83.6	90	6.1 ³
Chemical, Rubber and Petroleum Products	567.9	72	33.2 ³
Non-Metallic Mineral Products	67.6	90	5.0 ³
Other Manufacturing Industries	28.9	87	2.1 ³
Construction	174.6	0	0.0
Electric Power and Gas Utilities	637.7	1	0.4
Transportation and Storage	290.9	10	2.0
Communication	461.8	10	3.2
Trade	391.1 ⁴	4.7	1.3
Finance, Insurance and Real Estate	421.2 ⁴	4.7	1.4
Other Service Industries	302.0 ⁴	4.7	1.0
Government and Institutions	325.4	5	1.1
Total: Private and Public	6,057.4	36.9	156.6

¹Source: *Private and Public Investment in Canada: Mid-Year Review 1977*, (Statistics Canada No. 61-205, annual).

²Source: Taxation and Fiscal Policy Branch, Ministry of Treasury, Economics and Intergovernmental Affairs.

³Includes allowance for capital items charged to operating costs.

⁴Estimated from a larger sub-total.

⁷We find it impossible to track Agriculture accurately with this method and do not count its performance. The figure of 126 observations is thus obtained as 21 sectors, each of six years.

